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JOURNAL OF EDUCATIONAL RESEARCH

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JOURNAL *of* EDUCATIONAL RESEARCH

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A SURVEY OF PROBLEM PUPILS

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IN every school there are pupils whose behavior is erratic, peculiar, or abnormal, whose accomplishment does not measure up to capacity or whose ability is unequal to the tasks imposed. Some pupils persist in the retention of infantile habits long after most children have reached more mature stages of development. Others have developed undesirable attitudes which prevent them from making worth-while contributions and rational adjustments to the situations of both school and home. Some pupils have parents who hinder rather than help them in making normal adjustments. All of these pupils constitute problems which the average teacher has to meet. Such pupils frequently consume a disproportionate amount of the teacher's time, for they usually make uneconomical use of their own time and distract other pupils by their peculiarities.

As educators, we owe certain obligations to these pupils. Such problem pupils or behavior deviates should be detected at the earliest possible moment. Adequate diagnosis of the difficulties of such pupils should then be made, and remedial treatment and educational guidance should be arranged. At the Lincoln School of Teachers College an effort is being made to meet these obligations. Since at the time of writing only the first stage of the work, that of detecting the pupils to be diagnosed, had been completed, this discussion must be limited to the description of the methods used, the tabulation of the varieties and frequencies of the difficulties, and a summary of the facts discovered about problem pupils.

In the detection of a problem pupil, several sources of information and evidence must be utilized. The judgments of teachers who come in contact with him daily are of great value. Questionnaires filled out by parents giving detailed information about the pupil's

habits, development, background, physical condition, and the like, furnish important supplementary data, while psychological-test records constitute another valuable source of information for assistance in the detection of behavior deviates.

A survey was conducted by the psychologist's department, in order to obtain the assistance of teachers in the detection of problem pupils. Circulars stating the purpose of the survey and requesting certain items of information about problem pupils were sent to all teachers, both in the elementary- and high-school departments. A copy of the circular follows:

SURVEY OF PROBLEM PUPILS IN THE LINCOLN SCHOOL

TO ALL MEMBERS OF THE LINCOLN SCHOOL STAFF

There are two purposes for conducting this survey: (1) the immediate and practical purpose of assisting staff members in the discovery, diagnosis, and treatment of the difficulties of problem pupils, (2) the more remote purpose of recording data in order to study the facts about problem pupils in school and to evaluate methods of treatment in the light of the results obtained.

In the Lincoln School any child may constitute a problem who belongs to one or more of the following groups:

1. Pupils who are markedly deficient in one or more of the skills or tool subjects as compared with the average pupil in the same class.
2. Those whose behavior interferes with class work; such as anti-social, abnormal, erratic pupils; and those who are relatively undeveloped in moral and ethical traits.
3. Pupils who fail in general to make a reasonable amount of progress—very bright pupils who work far below capacity belong to this class.
4. Pupils, who for any reason in your opinion, would make better adjustments in other classes or groups.
5. Pupils considered "queer" by teachers, parents, and other pupils, whose behavior affects their own progress rather than that of others; those who are emotionally unstable; extremely self-conscious; have feelings of inferiority; have obsessions; daydream excessively; those with undesirable nervous habits.
6. Pupils with language handicaps; abnormal home conditions; problem cases in which the parents refuse or are unable to cooperate; cases in which the parents are the chief problem.
7. Pupils whose difficulties appear to be due primarily to physical defects such as malnutrition, defective vision, and the like.

The attached blanks are for your convenience in recording problem cases. Use a separate sheet for each child. The more comprehensive your report, the more valuable it will be.

The signatures of the school physician and psychologist were affixed to this request. Several blanks for recording pupils' names and describing their difficulties were attached to each circular.

The form of the questionnaire was:

THE LINCOLN SCHOOL OF TEACHERS COLLEGE

INFORMATION ABOUT PROBLEM PUPILS

Name..... Grade.....

1. Why do you consider this child a problem?
2. Have you discussed the difficulty with parents, teachers, administrators, physicians, psychologists? If answer is "yes," indicate whom you have seen by underscoring the appropriate words. When did the discussion take place?
3. Were recommendations made?..... What were they?.....
4. Were recommendations carried out?..... What was done?.....
5. Do you think a conference with everyone concerned in the case is desirable?
6. Do you feel that you already have the case well in hand, or that you have found the difficulty and can remedy it yourself?
7. Have you suggestions to make that would be helpful in dealing with the problem?..... What are they?.....
8. Additional remarks:

Signed..... Date.....

Adequate space was left between each question to provide for an answer.

The classification of problem pupils, as stated in the notice to teachers, was intended to give the teachers some suggestions as to what constitutes a problem case. This list was derived from the writer's experience with normal and abnormal school children and from classifications of others who have conducted similar surveys. A more comprehensive list might be devised in cooperation with teachers and administrators. Teachers frequently overlook certain types of problems unless their attention is called to them. Few teachers, for example, consider a child who does good school work but whom tests reveal to be working far below capacity, a problem. Some teachers fail to see in the unusually quiet, well-balanced child the problem which mental or physical tests reveal. Consequently, in asking teachers to report problem cases the possibility of the existence of various types of problems which they might otherwise neglect should be discussed with them.

The survey was conducted twice during the past year, in April and November. After the data sheets were assembled, charts were constructed for the elementary- and high-school departments sepa-

rately, setting forth the name of each pupil, his life age, mental age, Stanford-Binet intelligence quotient, grade, the name of the person from whom the information was obtained, the nature of the difficulty, suggestions for correction of the difficulty, and the further recommendations for diagnosis and treatment made by the psychologist. A few cases were included in the tabulation which were reported by parents or discovered independently by the psychologist but which were not reported by teachers. A few cases were also included which were reported to the psychologist verbally by teachers before the survey was undertaken. Pupils who were considered problems primarily because of poor accomplishment in one or more school subjects without other complications were not included in the tabulation. A separate investigation of these pupils was made, and the facts about their deficiencies were immediately reported to the principals of the elementary- and high-school departments. The following excerpts, which summarized the data about several problem pupils, were taken from the original charts:

Pupil 1:

Grade II; *MA*, seven years eleven months; *IQ*, 117.

The teacher reported that this pupil was lazy and inattentive and that he sat listlessly most of the time. He did not remember directions. Some time before the survey he developed a clever evasive mechanism, and he planned with his cousin to cough so that they could leave the room. The school physician discovered nothing wrong with the child physically and confronted him with the deception. The child seemed large and heavy for his age and grade. It was recommended that his case be referred to a physician or a nutrition expert as his diet might be wrong and auto-intoxication might be present. It was also suggested that his physical habits, sleep, etc., should be looked into as the first step in the study of his case.

Pupil 2:

Grade VI; *MA*, eleven years eleven months; *IQ*, 109.

The teacher reported that this child showed erratic, antisocial behavior which had been noted for several years. The home situation was part of the problem. The pupil bluffed and evaded responsibilities. The prognosis was not very promising. Much had already been done by the school to secure cooperation from the home and from the child himself. Since the child was becoming hardened in his attitude, his case needed thorough analysis. Conferences of all persons concerned were recommended as a part of the remedial suggestions.

Pupil 3:

Grade VI; *MA*, twelve years one month; *IQ*, 108.

The teacher reported that this pupil was untruthful and that he copied children's papers on tests. His class work was very poor. He was much given to teasing. Possibly he has been teased and bullied at home. He was unpopular with his classmates. It was suggested that the home environment should be changed though it seemed doubtful whether the parents would cooperate. The recommendations suggested were that a complete problem analysis be arranged to get at the cause of the difficulty and that every effort be made to enlist the parents' cooperation.

Pupil 4:

Grade IV; *MA*, nine years five months; *IQ*, 94.

The teacher reported that this pupil was individualistic, nervous, irresponsible, and dependent; that he showed antisocial behavior, inferior performance in motor skills, immature social and emotional development. It was suggested that he be examined by a pediatrist to determine his muscular strengths and weaknesses. A case study of this pupil had been begun several years before but had not been completed because the child's parents did not think a specialist was needed to study the case. Although the psychologist recommended that the case study should be completed, it will be impossible unless the full cooperation from the parents can be enlisted.

Pupil 5:

Grade IX; *MA*, thirteen years five months; *IQ*, 139.

The teachers reported that this pupil's behavior interfered with her class work; that she had abnormal moral traits and was extremely aggressive, and, at times, disagreeable. The parents suggested that the difficulty was a temporary one. It was recommended that a conference be arranged when her parents might meet all of her teachers, the principal, and others concerned in the case in an effort to discover the cause of her peculiarities.

Pupil 6:

Grade VII; *MA*, sixteen years three months; *IQ*, 130.

The teacher reported that this pupil did not comprehend directions, asked irrelevant questions during class which disturbed other pupils, had a peculiar manner of speech, and gave odd responses. This trouble had existed for four years. It was recommended that a complete case study be made.

Pupil 7:

Grade VII; *MA*, ten years six months; *IQ*, 85.

The teacher reported that a great language handicap prevented this child from making adequate contributions to the group and that he

was unhappy over his school work. He was deficient in the tool subjects and lacked background in common with other pupils. It was suggested that the boy should not be expected to do so much as the others of his grade and also that he should be made to realize that the standard of accomplishment set for him was that he do as much as he was able. This child had much talent in music. He will undoubtedly become a professional musician. He should, therefore, have every encouragement to attain success in this career.

Pupil 8:

Grade VIII; *MA*, thirteen years eleven months; *IQ*, 108.

The teacher reported that this pupil showed emotional instability, had short attention span, did poor school work, and seemed unaware of her irrelevant remarks. It was recommended that a complete case study be made.

TABLE I

NUMBERS OF BOYS AND GIRLS LISTED AS PROBLEM CASES

	High School		Elementary School	
	Boys	Girls	Boys	Girls
(1)	(2)	(3)	(4)	(5)
April survey	12	9	10	3
November survey	8	10	19	5
Both surveys	20	19	29	8

The total number of cases reported in the April survey was 34; in November, 42. The total school population was about five hundred. The percent of problem pupils reported in April in terms of the total school population was approximately seven; in November, about eight percent. There is no reason to suppose that the Lincoln School had a larger percent of problem pupils than any other institution, but at the Lincoln School every effort was made to discover the problem child and to provide for his individual needs. A more thorough investigation might have revealed more problems than have actually been reported in the survey. A tabulation of totals for the two sexes, separately, reveals the facts shown in Table I.

Although there was some variation in the actual number of cases in the two surveys, the proportions of boys and girls reported in both surveys were similar. Although in the high school approximately equal proportions of problems were reported for the two sexes, in the elementary school the boys outnumbered the girls more than three to one. Although the number of cases reported in the separate surveys was small—and these might appear to be chance results—there was marked consistency between the results

TABLE II

DISTRIBUTION OF PROBLEM PUPILS THROUGHOUT THE GRADES

	April Survey (Percent)	November Survey (Percent)	Both Surveys Combined (Percent)	Percent of Total School Population in Each Grade in November
(1)	(2)	(3)	(4)	(5)
	Elementary School			
Grade I	8.8	4.7	6.5	7.5
Grade II	8.8	9.5	9.2	7.5
Grade III	2.9	2.3	2.6	8.8
Grade IV	5.8	9.5	7.8	10.5
Grade V	8.8	19.0	14.4	6.6
Grade VI	2.9	11.9	7.8	7.3
	High School			
Grade VII	26.0	14.0	19.7	12.4
Grade VIII	14.6	16.6	15.7	10.1
Grade IX	11.7	9.5	10.5	8.8
Grade X	8.8	2.3	5.2	6.6
Grade XI	....	....	....	8.8
Grade XII	....	....	....	3.7

of the two surveys and the totals. Conclusions regarding the causes for the differences in the proportions of the sexes between the elementary and high schools would be unwise until further research has been undertaken. There was a slight excess of boys over girls in the total enrollment in the high school, and a somewhat greater disproportion in the elementary school. In the high school, the proportion of girls to boys was 9.7 to 10; in the elementary school, 8.8 to 10. This difference was not great enough to explain the disproportionate number of boys reported as problems in the elementary school.

The distribution of problem pupils by grades is given in Table II. The results for both surveys combined show that the fifth, seventh, and eighth grades contain the largest percentages of pupils reported as problems. The percent of problem cases is somewhat larger than the actual percent of pupils of the total school population in each of these grades. For the fourth grade, a small percent of problem cases was reported as compared with the percent of all pupils actually in the fourth grade. The causes of these discrepancies may be due, in part, to variations in teachers' interest in the survey from grade to grade; or they may be due to the fact that more problems are to be expected in the upper elementary

TABLE III

AGES OF THE PROBLEM PUPILS

Age in Years	Elementary School	High School	Total
(1)	(2)	(3)	(4)
5– 7	12	.....	12
8–10	22	1	23
11–13	3	26	29
14–16	.....	12	12
17–19	.....	.....	.....
Median ..	9–3	13–4	11–4

grades and in the first two years of high school than in the other school years.

The distributions of the chronological ages of the problem pupils in both surveys are given in Table III. The median ages of all the pupils enrolled in Lincoln School may be compared with the median ages given in this table. The median ages for the total school population are:

	Median Age
Elementary school	8-8
High school	14-1
Total school population.	11-4

Although the median age of problem pupils in the elementary school is slightly older and the median age of the high-school problem pupil slightly younger than the median elementary- or high-

school pupil in the total school population, the median age of all problem pupils reported is just equal to the median age of all pupils enrolled in Lincoln School. The Stanford Binet intelligence quotients of the members of the two survey groups are combined in the frequencies given in Table IV.

When the 76 problem pupils are classified into three groups on the basis of their intelligence quotients the following percents falling to each group are found:

Intelligence Quotients	Percent
75-104	38.1
105-124	43.4
125-160	18.4

These percents differ widely from those for similar intelligence-quotient groups in the total school population. The percents for the entire school, recently computed, are:

Intelligence Quotients	Percent
75-104	13.4
105-124	53.2
125-160	33.2

These figures show that the child in the general population of this school with an *IQ* of less than 105 is comparatively rare as contrasted with pupils with higher intelligence quotients. It appears from the percents for the group of problem pupils that the child with an *IQ* of less than 105 is more apt to be reported as a problem than chance selection would allow. It is also true that the child with an *IQ* of less than 125 is less apt to be reported as a problem than we would expect from chance selection. The percent of problem pupils with *IQ's* of less than 105 is almost three times as great as the percent of pupils below 105 in the total school population. On the other hand, although the school population contains 33 percent of pupils with *IQ's* of more than 125, the problem-pupil group contains only about half as large a percent of pupils belonging to this class. The percent of problem pupils with *IQ's* between 105 and 124 is slightly smaller than the percent of such pupils in the whole school population. The median intelligence quotient for the entire group is about 119. For the group of problem pupils the median is 110. The difference is almost twice as large as the probable error of the test.

Test data for the computation of the educational quotients of the problem-pupil group were available for 48 of the 76 problem pupils reported in both surveys. The educational quotients for pupils reported in the April survey were computed from the Stanford Achievement Test. Those for the November survey were computed from the results of the Otis Classification Test. The average educational quotient for all problem pupils is 107; for a sampling of pupils in the entire school, approximately 117. We may conclude from these figures that the pupils reported as problems in the classroom tend to have relatively both lower intelligence quotients and

TABLE IV

DISTRIBUTION OF THE STANFORD-BINET INTELLIGENCE QUOTIENTS OF THE PUPILS CONCERNED IN THE COMBINED SURVEYS

Intelligence Quotient	Elementary School	High School	Total
(1)	(2)	(3)	(4)
70– 79	.....	2	2
80– 89	.....	7	7
90– 99	7	4	11
100–109	13	5	18
110–119	8	6	14
120–129	3	7	10
130–139	5	5	10
140–149	1	2	3
150–159	.....	.....	.....
160–169	.....	.....	.....

educational quotients than pupils in the school, generally. The fact must not be overlooked that the bright child of good accomplishment is frequently reported to be a problem. The figures reported in this study indicate, however, that such pupils are less frequently reported than pupils of less ability and poorer achievement.

The question may be raised, "Were the children who were reported in the April survey also reported in November, provided they had remained in school?" Of the thirty-four children reported in April, eleven, or about one-third of the group were also reported in November. All of these pupils had changed classes and were

being taught, for the most part, by a new set of teachers. In a few cases in the high school, the pupil was being taught in one or more subjects by the same teacher he had had the previous year. Of all pupils who were reported on both surveys by the same or different teachers, the following facts were discovered: one child was reported to be a problem by seven persons; two children were reported to be problems by three persons; and eight children were reported as problems by two persons.

Individuals varied greatly in the number of pupils they reported as problems. The frequencies of cases reported by different individuals follow:

Persons Reporting	Pupils Reported by Each
1	10
1	7
4	4
5	3
10	2
21	1

This variation in the number of pupils reported by different individuals may be due to a number of factors. It is possible that the persons reporting the larger numbers of problems are better able to detect problem pupils, are more interested in the survey, are more willing to admit that they have problem pupils, or actually happen to come in contact with larger numbers of problem pupils.

A summary of the types of problems reported in the November survey was prepared from the statements made by the persons reporting. The writer classified the problems in a way that seemed most logical and consistent. The types of problems and the cases of each type found are listed in Table V.

Deficiencies in the various school subjects, poor study habits, and general mental immaturity are much more frequently mentioned as reasons for reporting pupils as problems in the high school than in the elementary school. In the elementary school, the unstable, nervous, shy, emotionally peculiar child is reported as a problem more frequently than in the high school. The badly spoiled, dependent, irresponsible child is also more common in the elementary school than in the high school. The other types of problems show about the same percents of frequency in each type

of school. How can we explain the difference in types of problems reported in the elementary school and high school? The high-school

TABLE V

TYPES OF PROBLEM CASES REPORTED IN NOVEMBER SURVEY

THE PROBLEM	ELEMENTARY SCHOOL		HIGH SCHOOL		TOTAL	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I. Deficiencies in school subjects, study habits, physical skills, general immaturity, poor mentality	9	19.1	14	42.4	23	29.0
II. Unfavorable home conditions, parents constitute a large part of the problem	7	14.8	5	15.1	12	15.0
III. Nervousness, irritability, abnormal shyness, or aggressiveness, erratic peculiar behavior, cases of stuttering, and irrational fears	13	27.6	6	18.1	19	23.7
IV. Bad habits, wrong attitudes, cases of badly spoiled, or dependent children, laziness, inattention, evasion of responsibilities	10	22.2	3	9.0	13	16.2
V. Antisocial behavior, predelinquent tendencies, disciplinary problems, cases of poor social adjustment	6	12.7	3	9.0	9	11.2
VI. Poor physical condition; physical handicaps which may interfere with school work	2	4.2	2	6.0	4	5.0
Total	47	.....	33	.....	80	.....

teacher sees his pupils for shorter periods of time than the elementary teacher, and he is possibly concentrating more closely upon subject-matter. Since the elementary teacher undoubtedly has

more opportunity to observe a pupil's total behavior than has the high-school teacher, she likely puts more emphasis upon the behavior of the child. We must conclude that the difference in types of problems reported in the elementary and high schools is due either to the fact that high-school teachers have less opportunity to observe nervousness, instability and erratic behavior, bad habits, and the like; or that they consider such traits less important problems than the pupils' deficiencies in school work and poor mentality. The treatment suggested by the persons reporting the cases was further supplemented by recommendations made by the psychologist who gave careful study to all the material. These recommendations were given to the principals of the high-school and elementary-school departments. In many cases the only recommendation possible was that further information must be obtained about the case. Few of the problems reported can be regarded as serious clinical cases. In a few cases the problem was complicated, or the nature and causes of the difficulty were obscure. Some of the problems were already well understood and needed little further diagnosis. In some of the cases, the prognosis seemed hopeless. Learning capacity cannot usually be increased, and it is frequently impossible to change the attitudes of parents and home environment. Some of the pupils needed a twenty-four hour remedial program which could not be provided in most cases.

A few general suggestions for further diagnostic and remedial work grew out of the experience gained in this survey:

1. Many more facts than were available should have been recorded about each of these pupils. Most of the pupils should be observed by competent, unprejudiced persons from time to time, and the observations should be recorded in writing. A program of the activities of the child during the average day from the rising hour to bedtime would be helpful in some cases.
2. Parents should be asked to come for conferences at which the child's difficulties are discussed. The homes of problem pupils should be visited when this measure seems necessary and is practicable.
3. Clinical study is necessary in the more serious cases of maladjustment. Such study should bring together all available data as to the child's heredity, family history, developmental history,

home background, school record, present physical condition, mental and educational status, parents' and teachers' reports of the child's behavior, and the child's own story of his difficulties, if he recognizes them. Recommendations for treatment should follow an analysis of the difficulty.

4. In some cases, the reclassification of the pupil within the school appears to be the solution of the problem. In the other more extreme cases, the parents should be advised to transfer the child to a different institution.
5. All pupils who appear to suffer primarily from physical disturbances should have more thorough medical examination. Neurological examinations will be necessary in several cases. The advice of nutrition experts should be sought in others.

Few of these problems will disappear in a day. Many will persist for months. It may be a comparatively simple matter to detect the difficulty and to recommend the proper correctional procedure, but it is quite another matter to re-educate a child who has persisted in bad habits and attitudes for a period of years. In many cases it is even more difficult to secure assistance from adults whose cooperation is necessary if a child's behavior is to be altered. But it is obviously unfair to give up any problem pupil as hopeless before a thorough analysis of the situation has been made and remedial measures have been undertaken.

We may not hope that progressive educational methods will reduce the incidence of problem pupils in the school population. With the greater refinement of our tools for observation and with a growing fund of information furnished by genetic studies of school children, the most hopeful prospect is that problem cases may be detected more readily than is possible at present, that remedial and corrective measures may be employed in the incipient stages of the difficulty, and that such treatment may become more scientific.

NEW THINGS THAT ARE REALLY OLD

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BEFORE the maximum service of any movement can be economically rendered, a critical evaluation of what has already been done by other persons is often necessary. When this principle of procedure is applied to any educational activity, as curriculum-making, present-day educators are driven to an examination of methods of curriculum construction in the past. Such canvass can be of great profit if it reveals persistent problems and suggestions for their solution.

Of the numerous problems which have persisted for centuries, four modern curricular problems which are really old are here presented. These problems will be suggested for two purposes: first, to emphasize the prevalence of persistent problems in education and, second, to set up challenges for ourselves. That is, an educational problem which has defied scholars for centuries is the rightful property of the Research Association. Furthermore, our contemporary outsiders may properly expect scientific educators to advance beyond early scholars who had to depend upon intuition and empirical data. This challenge will be accepted only when these problems are successfully attacked and the nature of the advances clearly interpreted to our challengers.

1. *The opposition to new learning.*—The resistance of the masses to the findings of scientists was particularly fatal during the Athenian Age, for it is recorded that upon two occasions, generations apart, a disregard for "modern" science led to the destruction of armies of Greeks. Upon one of those occasions, an army of forty thousand soldiers was halted in their plans for a prudent retreat by an eclipse of the moon. The difficulty was not that they were unable to find their way during the eclipse, but they were warned by their prophets that the eclipse indicated the wrath of Diana and that a month of quiet was obligatory as a penance. As the enemy's prophets were not disturbed in the same way by the eclipse, all the Greeks were either massacred or sold into slavery. It seems also that the Greek prophets, as ministrants of morals,

patriotism, and soundness of faith, had, shortly before that time, exiled an enlightened general, and that they had otherwise disregarded the teachings of Anaxagoras about the causes of eclipses. Opposition to science in this matter persisted, however, so that the Thebans, over one hundred and fifty years later, similarly suffered defeat for their bigotry. The Greeks finally met this situation successfully by educating their lawmakers in science and tolerance.[1]

During the twelfth century Adelard of Bath complained not only of his generation's inborn prejudice against new ideas, but he also satirized the prevailing reliance upon past authorities and gave a remedy for that defect. It is difficult, he complained to his nephew, to discuss certain topics of biology. He continued:

> I learned from my Arabian masters under the leading of reason; you, however, captivated by the appearance of authority, follow your halter. Since what else should authority be called than a halter? For just as brutes are led where one wills by a halter, so the authority of past writers leads not a few of you into danger, held and bound by bestial credulity.

From those worshippers of authority, Adelard distinguished himself, and added:

> If you want to hear anything more from me, give and take reason. For I'm not the sort of man that can be fed on a picture of a beefsteak.[2]

The new literary learning at the dawn of modern times encountered difficulties similar to those of science. Petrarch, for example, was compelled to defend the classical learning against two groups of enemies. One of these groups was composed of persons who, like many mediaeval scholars, feared contamination with the evil thoughts which the classics subtly bear. The other group was composed of persons who had already been demoralized by the heathenish teachings of Virgil. After giving the members of the second group a permanent and forcible dismissal from his home, he set his own position clear in a letter to Boccaccio. There he protested that he knew of no one who had been "prevented by literature from following the path of holiness."[3]

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[1] Cf. John Burnet, *Early Greek Philosophy*. London, A. and C. Black Company. 1920. p. 271, for a translation of the Greek sources on this point.

[2] *Questiones naturales*, cap. 6. Lynn Thorndike, *The History of Magic and Experimental Science*. Macmillan Company, 1923. Vol. II, pp. 28-29.

[3] Translated in J. H. Robinson and H. W. Rolfe, *Petrarch: the First*

Lawmakers, priests, and the ignorant masses are not, however, the only opponents of new learning. It seems that any man who leaves the beaten path of purified folkways is liable to disaster. As an example, Dr. William Harvey may be cited. Harvey was a successful practitioner and, up to a certain date, was highly respected by the members of his profession. Meanwhile, he conducted researches and even frequented the university halls. He discovered that current notions of the human circulatory system were erroneous and set up in their place the results of his discovery. Thereupon, the members of the medical profession discovered that he "was crack-brained," and they all turned against him.[4]

One of the best and most fundamental discussions of the attitude toward new learning is that of Aquinas. Although he discussed the problem with reference to Christianity, his procedure has equal merit with regard to heresy in other departments of thought. He advised that the study of philosophy and science be not merely rendered innocuous, but that instead it be pursued wheresoever facts warranted. He contended that theology and natural science were largely distinct, and that theologians should not attempt to settle philosophical or theological problems of which they knew little, for "Christians who deny as contrary to their faith the philosophical solutions of problems which are really indifferent so far as the Faith is concerned, simply bring Christianity, in Aquinas' opinion, into disrepute among the wise men of the world."[5]

2. *Systematic criticism of curricular practices.*—The systematic criticism of curricular practices is no new adventure. A brief review of this branch of educational literature will indicate the antiquity of many present-day criticisms of schools. Early in the splendid days of both Greece and Rome, critics deplored the vanishing education of bygone golden ages. Later, during the Athenian period, Isocrates contrasted the superficiality of the short unit

Modern Scholar and Man of Letters. New York, G. P. Putnam's Sons, 1914, p. 293. *See also* R. C. Jebb in *The Cambridge Modern History.* New York, Macmillan Company, 1907. p. 538.

[4] Aubrey, John. *Lives of Eminent Men.* London, Longman, Hurst, Rees, Orme, and Brown, 1813. Vol. II, Part II, pp. 376-86.

[5] Cf. Thorndike, *op. cit.*, pp. 600ff. for a more complete discussion and source references.

courses of the Sophists with the scholarship of his own broad, liberal courses.[6]

Plato also indulged in criticism in his comments on literature and music. His analysis of the materials of reading showed him, as modern analyses of literature show modern educators, that many of the time-honored writings of the prophets are unwholesome for the moral and religious training of the young. Somewhat later Tacitus criticized severely the practices of his times, which not only permitted parents to set base examples for their children, but also to shirk their own responsibilities by substituting school training for home training.

Mediaeval scholars had similar difficulties with their schools. They were annoyed by both charlatans and pedants. The long-winded pedants analyzed their subjects and magnified their elements until, according to Roger Bacon, a pupil had to give years of unnecessary time to extracting the essentials of such a subject as geometry. Indeed, Bacon could, so he said, teach more useful geometry in a fortnight than the other friars did in ten or twenty years. Another educator, slightly later than Bacon, relieved the crowded curriculum by reconstructing the course in science so that one might learn from his little treatise not only the gist of "innumerable works and huge tomes," but also many important points which pedantic authors had omitted.[7] In reconstructing their curricula, mediaevalists had also to contend with the demand for practical courses. It was the belief of many teachers that boys could profitably economize their time by the shortening and enriching, or even the omitting, of grammar. The economy thus effected enabled the boys to proceed more directly to the popular "modern" courses in commercial subjects. Chief of these new courses was correspondence—the art of letter-writing came near over-shadowing the training in language and composition as then included in grammar. Other practical modern subjects such as law and medicine were opened to boys when the mechanics of reading were mastered. To make the situation worse for sound scholarship, the teachers of the

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[6] *On the Sophists.* Translated in R. C. Jebb's *Attic Orators.* New York, Macmillan and Company, 1876.

[7] Thorndike, *op. cit.*, Vol. II, pp. 630-49 are devoted to these points.

practical subjects flagrantly advertised their powers and the creditable opportunities for rapid advancement in commercial occupations. The resulting decline of interest in grammar inspired a scholar to produce the educational treatise entitled *The Battle of the Seven Liberal Arts*. In that battle grammar was humbled so that she withdrew into Egypt where she was born, thus leaving the field open for the knights of economy of time in education.[8]

Grammar did not, however, actually withdraw to Egypt, and, after Italian humanists had breathed life into classical study, grammar and the analysis of literature rose and again dominated the curriculum of many schools. That form of stylistic degeneracy known as Ciceronianism drew from Erasmus a satire entitled *Ciceronianus*, which ridiculed the endless verbalism of decadent humanism.[9] Rabelais, a contemporary of Erasmus, sought also to shorten the course in grammar by a satire which should have put an end to pedantry. In this interesting account of the *Lives, Heroic Deeds, and Sayings of Gargantua and His Sonne Pantagruel*, Rabelais recorded that Gargantua was carefully trained for "thirteen years, six months, and two weeks" in Latin grammar. Thereafter, he spent about nineteen years studying the comments of pedants upon the classics, and then sixteen years and two months finding out "the age of the moon, the seasons of the year, and the tides of the sea," and then his preceptor died! As the boy's education was still incomplete, "he got an old coughing fellow to teach him" still other "meally stuff" whereof he became exceeding wise. Later, Gargantua forsook this old "muzzled dolt" and went to Ponocrates who, after purging him thoroughly of all that he had already learned, began a systematic, economical and beneficial course of study wherein he speedily mastered all the arts of his day.[10]

Many other early modern writers resorted to satire or to straightforward criticism of curricular practices. One of the chief

[8] *See* L. J. Paetow's translation of Henri d'Andeli, *The Battle of the Seven Liberal Arts*, Memoirs of the University of California, Vol. IV, No. 1, 1914. This volume contains a valuable introduction which describes the educational conditions of the thirteenth century.

[9] *See* Izora Scott's translation. Teachers College, Columbia University, 1908. (Teachers College, Contributions to Education, No. 21)

[10] *Op. cit.*, translated by Thomas Urquhart. CHAP. XIV and XXIII.

of these was Francis Bacon who restated in general terms nearly all the criticisms of learning that had already or have since been made. As examples of criticisms which have recently been effectively repeated, there are Bacon's assertions (1) that educators are too prone to venerate uncritically either antiquity or novelty; (2) that educators assume that all possible opinions have been thoroughly tested and that only the best have prevailed; (3) that educators neglect to state clearly the objectives of education; and (4) that educators are so provincial and complacent as to be led blindly by their enslaving devotion to certain subjects, so that they cannot even interpret objective evidence with due suspension of judgment.

Vives and Comenius, before and after Bacon's time respectively, emphasized the importance of organizing instructional material to suit the individual capacities of learners. By classifying pupils according to no less than nine significant categories of individual differences, Vives set the problems which have engaged modern experts in mental testing and curriculum construction.[11] By organizing and restating the laws of readiness and facility in learning, Comenius laid the psychological foundation for his own reconstruction of curricula and for the reconstruction of each secondary-school subject during the twentieth century.[12] Daniel Defoe, who had been trained in a nonconformist academy, was somewhat more fiery and pointed in his attacks upon curricula. His analyses of certain occupations in which he was interested convinced him not only that the curriculum of Latin grammar schools was useless, but also that by its dullness, it operated as a selective device to deter promising lads from school.

Numerous additional critics, as Socrates, Marcus Aurelius, Adelard of Bath, and Descartes might also be mentioned. Enough cases have, however, been cited to show that problems similar to those made during the twentieth century existed in earlier times, and that those problems evoked criticisms worthy of Huxley, Eliot, or Flexner.

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[11] *The Transmission of Knowledge.* CHAP. III. See Foster Watson's translation in *Vives: On Education.* Cambridge University Press, 1913.

[12] *The Great Didactic.* CHAP. XVII-XIX. Translated by M. W. Keating. London, A. and C. Black, 1896.

3. *Activity analyses as bases for objectives.*—Although activity analyses have been conducted since Plato's day for the purpose of discovering what should be taught, the recent use of the term "activity analysis" has led certain conservatives to oppose such procedures as both novel and narrow. Great differences exist, however, among the forms of activity analysis. Plato, for example, analyzed in the *Republic* with considerable care the activities of a society which never existed. Consequently, Plato's objectives lacked the close relationship to actual performances and conditions that is possessed by later formulations.

Erasmus derived a system of objectives by analyzing organized activities in an enlightened community. He found that social efficiency and academic proficiency were inseparable in the religious, domestic, civic, and vocational lives of the persons whom he examined—churchmen, landed proprietors, and diplomats. His findings led him to conclude that certain desirable characteristics apparently necessitated the formal training of the young. As the individuals about whom he showed most educational concern were of the sort whom Plato expected to develop into "philosophers," the plan of Erasmus would have serious limitations in an age of universal education. A superficial survey of a state or a community with the present-day point of view would have yielded numerous items, such as training for every one who was engaged in the numerous activities which Erasmus quite overlooked.

A contemporary of Erasmus, Castiglione, also derived the objectives of education from his observation and analysis of activities. Since he was so unfortunate, however, as to overlook almost the entire world by confining his analysis to the activities of court life, his work also has little general application in a democracy. These three cases of activity analysis are cited as examples of the antiquity of certain aspects of this procedure. Their partial failure to provide adequate bases for objectives can be attributed in part to their restricted scope and in part to their undemocratic philosophy.

4. *The enrichment of courses.*—The enrichment of courses by skillful teachers, a topic which forms the basis for many modern discussions, was not neglected by great teachers of the past. As examples, teachers of the Athenian, Roman, mediaeval, and early modern periods will be cited. Isocrates mentions and Quintilian

describes in detail this procedure. Alcuin attempted to enrich and enliven the mediaeval curriculum by the introduction of humorous pleasantries into his discussions with pupils.[13] The results of mediaeval curricular enrichment are shown impressively also in the accounts of Roger Bacon's famous teacher, Robert Grosseteste. This great educator taught young Bacon the use of languages as well as their constructions, thus impressing upon Bacon the fact that a knowledge of languages was the first gateway to the sciences.[14] It was this scholar who, besides knowing the languages and sciences, inspired Bacon's own life of experimental research. In the early modern period, Vittorino enriched by word and deed his curriculum of physical education, literature, science, and social studies.[15] The effects of enrichment of courses upon pupils and society at large is well illustrated also by a line of teachers beginning in the seventeenth century with Theophilus Gale. This man developed, in his pupil, Thomas Rowe, a keen desire for sound scholarship such as can still be traced in Gale's *The Court of the Gentiles*. Rowe, in turn, transmitted his zeal for breadth of scholarship to his famous pupil Isaac Watts, whose work, entitled *The Improvement of the Mind*, was one of the elements of enrichment in academies for several generations. Watts, who was also a teacher, was generous in his praise of the "director of" his "youthful studies" and, in a poem, "To the much honored Thomas Rowe," extolled his master's freedom from the trammels of tradition. The extensive value of this line of great teachers can be inferred from Samuel Johnson's essay on Watts in his *Lives of the Poets* where Johnson asserted that few books had given him greater pleasure than that of Watts and that Watts "taught the Dissenters to court attention by the graces of language."

The frequency with which great men are inspired by teacher enrichment is suggested by these cases. Valuable enrichment has

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[13] Mombert, J. I. *A History of Charles the Great*. New York, D. Appleton and Company, 1888. p. 247.

[14] Bacon, Roger. *Opus Tertium* (Brewer's edition), CHAP. 10 and 28. Also see, "Der Einfluss des Robert Grosseteste auf die Wissenschaftliche Richtung des Roger Bacon" in *Roger Bacon Essays*, collected and edited by A. G. Little. Oxford, Clarendon Press, 1914.

[15] Woodward, W. H. *Vittorino da Feltre and Other Humanist Educators*. Cambridge University Press, 1897. pp. 66ff.

not, however, always followed a desire to show pupils the possibilities of the course of study. At the hands of teachers who have forgotten their own childhood, dessication and pedantry instead of enrichment seem to have resulted from ambitious attempts to show the ramifications of subject-matter.

5. *The relation of research to old practices.*—A diagnostic study of historical cases suggests numerous opportunities for developing an alliance between research and the history of education. Such an alliance would probably lead to the complete discarding of many outgrown practices and to the alteration of others. As a conclusion to this paper, some of the reasons for the failure or the success of the four types of old practices here presented will be stated as principles of educational research.

First, the persistent opposition of many human beings to new learning is probably due in part to the shortcomings of the advocates of new learning. These advocates have often failed because they neglected to interest other persons in the problem or to state the problem clearly to them. The public, like children, must either feel the need for the solution of a problem or be enticed into new paths of learning. The failures of the past can be attributed also in part to three additional defects in the methods of advancing science; namely, the inability or the unwillingness to share knowledge with fellow-workers or the masses, the inability to utilize objective data, and the failure to show positive, convincing examples to influential conservatives.

Second, valid criticisms of curricular practices have often been unheeded because of remediable difficulties. Critics of superficial courses have failed because they lacked objective data which might have supported their own cases. Mediaeval and early modern critics were unable to fortify their criticisms by experimental teaching or any other method of obtaining objective evidence. An allied difficulty was their inability to engage the support of well-trained teachers. Critics also have often been unsympathetic with their fellow-workers and have thus neglected their strongest potential allies. In the cases in which criticism has been most successful in changing practices, one or more of four conditions have been present: (1) there has been effective publicity of the problem and

its solution; (2) there has been clear evidence of its advantages; (3) there has been due consideration of the attitudes of the persons who received the criticism; or, (4) there has been a body of trained workers and other facilities for effecting a reform.

Third, activity analysis is sufficiently venerable to command respect. Its failures seem to have been due to three causes: the narrow scope of the analysis; the inadequacy of the proposed subject-matter; and the inadequacy of the educational philosophy which has underlain it.

Fourth, the enrichment of courses has illustrations in every important era of history. It now seems clear that one of the most important reasons why such enrichment has been intermittent is that teaching procedures have in the past received too little attention: good teachers have developed rather by chance than by definite training, and, hence, there have been few of them. The effects which would have followed a general provision of an excellent course in education, such, for example, as Vittorino received, can only be inferred. There was, at any rate, little knowledge of how or why to enrich courses. There was an almost total lack of objective educational data, and there was no adequate means of disseminating even the best principles of teaching.

An age of research should go beyond the ages of intuition. The present-day should, however, sift the intuitions of the past and demonstrate the values of the best. For this task the present age of research has many advantages over earlier periods: it has better resources for analysis, better measures of individual differences of pupils, better weapons against superstition, better resources for enrichment of subjects, and better criteria for reconstructing subject-matter and educative activities. Furthermore, there is now in general a tolerance of criticism, and there is slight educational defense of dessicated courses. Research is challenged to accept the responsibility of discovering the best in history and philosophy, of demonstrating under known conditions the superiority of the best and of cooperating in the training of teachers to practice in the profession of teaching.

FINDING MISTAKES VERSUS CORRECT ASSOCIATIONS IN SIMPLE NUMBER-LEARNING

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AN ATTEMPT will be made in this report to answer the question, "Is it more profitable to find mistakes or to repeat correct associations?" The problem becomes more explicit when expressed in some such form as, "Is it better to observe that $8 \times 7 = 54$ is wrong, when it appears among several other number combinations which are correct, or to think to one's self, $8 \times 7 = 56$?"

In an effort to answer this question, 564 elementary-school children were tested individually. Half of them were given the task of finding mistakes in a list of twenty simple number combinations; the other half were set to saying over to themselves these same twenty combinations with their correct answers. From the alphabetical list of the names of the children enrolled in each class chosen for this study, the members of each group were chosen alternately so that half might be exercised with the page of correct associations on the study with correct answers; and the other half practiced on finding mistakes.

First, the experimenter ascertained whether the pupil was wholly familiar with the four arithmetical signs. If he made an error in such discrimination, he was given practice until he had completely mastered the task. No child who in this preliminary test made more than one mistake was used in the study. Every child was first given a sheet with these problems:

$8 + 24 =$	$8 - 2 =$	$7 + 15 =$	$3 \times 8 =$
$12 - 5 =$	$5 \times 7 =$	$4 + 8 =$	$4 + 13 =$
$6 \times 4 =$	$11 - 2 =$	$10 - 6 =$	$15 - 3 =$
$7 \times 3 =$	$9 \times 4 =$	$9 \times 5 =$	$8 + 9 =$
$6 + 5 =$	$17 - 8 =$	$2 + 7 =$	$13 - 6 =$

As the pupil answered verbally, the experimenter recorded the answer and kept the time.

The pupil belonging to the Error-Finding Group was then given an exercise which was comprised of the following combinations:

7 × 3 = 21	9 × 5 = 45	15 − 3 = 18	9 × 4 = 28
4 + 8 = 12	8 − 2 = 6	8 + 24 = 32	10 − 6 = 4
6 × 4 = 22	8 + 9 = 15	5 × 7 = 35	7 + 15 = 21
11 − 2 = 9	12 − 5 = 7	6 + 5 = 11	17 − 8 = 9
4 + 13 = 17	3 × 8 = 24	2 + 7 = 9	13 − 6 = 7

The experimenter said: "Here the same problems, in a different order, are answered. Some of the answers are right and some are wrong. Draw a circle around each wrong answer. Do not do anything with the other answers." After the pupil had finished he was given the same test which he had had at the outset.

The pupil of the Correct-Association Group was given as his second task a sheet on which all the answers were right. To him was said: "Here the same problems, in a different order, are answered correctly. Say each one with its answer to yourself." After he had finished he was given the same test which he had taken at the outset. By this method the children of both groups were given the same test before and after the training exercise. The only variable was this intervening task: for one group it was to find mistakes; for the other it was to read silently the combinations with their correct answers.

If then the two groups were evenly matched on initial performance, whatever difference there was between the final performance of the two groups must have been a measure of the difference of the degree of learning due to the intervening exercise. As we shall see later, these two groups received on the average, almost equal percents as measures of time and accuracy in the initial performance. From the records of 276 fourth- and fifth-grade children, one-half of whom had received each type of intervening training, 100 pairs were matched on the basis of the time taken for the initial performance. The time of each pupil in a pair was within two seconds of that required by the other member of the pair. The difference between the gain in the final performance of these two groups should be a measure of the relative value of the two intervening exercises.

Of course, one would expect some practice gain if there had been no intervening learning exercise; that is, if the test exercise had been given twice in succession. One hundred forty-seven chil-

dren of the fourth and fifth grades were so practiced. Of these, 100 pupils were matched with 100 from the Correct-Association Group on the basis of the time taken to do the initial test; and 100 were matched with 100 pupils from the Error-Finding Group. Naturally, using this basis, the same hundred pupils of the 147 were not matched with each group. The results of these comparisons expressed as percents of gain were:

	Time Required (Percent)	Errors Made (Percent)
When 138 pairs were chosen alternately:		
Correct-Association Group	22	50
Error-Finding Group	11	33
When 100 pairs were matched by time of initial performance:		
Correct-Association Group	21	53
Error-Finding Group	11	34
When 100 pupils were matched with 100 pupils having only successive practice:		
Correct-Association Group	21	48
Successive Practice Group	18	28
Error-Finding Group	10	33
Successive Practice Group	18	27

In the first place, the percentage gain expressed as reduction in time and errors for the 138 pairs chosen alphabetically is almost exactly the same as for the 100 pairs which were selected by matching the time required for initial performance.

The gain by the pupils who read the 20 combinations with their correct answers once was noticeably greater than the gain by those who were set to find the 5 errors. For the Correct-Association Group the gain in time on the final performance was only slightly greater—not significant perhaps—than by the Successive Practice Group but the reduction in errors was noticeable—48 percent against 28 percent. However, those who found mistakes made less gain in time and more in errors than those with successive practice, although these differences may be too small to be significant.

It may be concluded that one reading of these twenty combinations with their answers contributes more to learning than no such reading, and that it contributes much more than the search for the 5 mistakes among the 15 correct answers. On the other hand, there is no evidence that anything is gained by the finding of errors.

Instead, there seems to be an appreciable loss. These data are significant when one considers that the exercise is brief and that only one intervening exercise was done.

Similar results were obtained when comparisons were made within each grade and half-grade. Comparing 51 pairs of V-A pupils we found that the gain in time on the final test over the initial test for the Correct-Association Group was 22 percent against 13 percent by the Error-Finding Group. The gain in accuracy or the decrease in errors was 53 percent against 25 per-

TABLE I

AVERAGE TIME AND ERRORS

	TIME IN SECONDS				ERRORS	
	Initial Performance	Learning Exercise	Final Performance	Learning Exercise and Final Performance	Initial Performance	Final Performance
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Correct-association group...	101	64	79	143	2.9	1.5
Error-finding group.....	100	94	89	183	2.9	1.9

cent. For the 32 pairs of V-B pupils the respective reduction in time for each group was 20 percent against 8 percent; in errors, 55 percent against 38 percent. For 38 pairs of IV-A pupils the contrasted percents were 19 against 10 in time; 42 against 34 in errors. The record for 17 pairs of IV-B pupils was 28 percent against 9 percent in time; 54 percent against 38 percent in errors. For eight still smaller groups, we found the same relative superiority, without exception, for the correct-association method.

For further evidence of the superiority of the correct-association method, let us compare the number of pupils gaining in time and accuracy in the final performance over the initial performance. Five of the 100 pupils who were given the correct-association exercise took more time on the last performance than on the first, while thirty-two of the 100 given the error-finding exercise took more time. The respective figures for errors were 6 and 13.

The time taken by the average pupil on the initial performance, on the final performance, on the exercise with correct answers by

the correct-association method, and on the exercise at finding errors are given in Table I. These figures were for the members of 138 pairs alternately chosen.

Here we see that the two groups made, on the average, the same number of errors—about 3 out of 20—and took practically the same amount of time on the initial performance, while on the final performance the time and errors greatly decreased. But the Error-Finding Group took about 50 percent more time in the learning exercise—in their exercise of finding errors—than the Correct-Association Group took to say once to themselves the twenty combinations with their answers. Since they used more time in this learning exercise, they should be expected to do better in the final performance than the other group. But they did considerably worse!

Suppose the time of the learning exercise and of the final performance is compared as a measure of the difference in the efficiency of the two methods. Here we find that it takes the Error-Finding Group a total of 183 seconds to reduce their errors from 2.9 to 1.9 and the Correct-Association Group only 143 seconds to reduce their errors from 2.9 to 1.5.

Some one may suggest, however, that the difference in time between the two learning exercises may be attributable to the time required in drawing circles around the 5 wrong answers. After these had been checked for them, the average time required by the 30 children studied was only 5.9 seconds.

The following 20 addition combinations were used with 144 pairs of third-, fourth-, and fifth-grade children after the procedure used with the 138 pairs already studied.

25 + 7 =	8 + 6 =	8 + 15 =	**6 + 14 =**
5 + 11 =	15 + 4 =	16 + 3 =	24 + 7 =
9 + 13 =	6 + 7 =	9 + 8 =	2 + 6 =
8 + 7 =	13 + 8 =	4 + 6 =	7 + 1 =
3 + 10 =	2 + 8 =	5 + 7 =	6 + 9 =

The number of errors on the learning page used by the Error-Finding Group was 10, instead of 5, as in the other study. The average time and errors are given in Table II.

Here we find the same strong evidence of superiority of the Correct-Association Group. The initial time of performance for the

two groups was the same, whereas the Error-Finding Group made fewer errors on the first trial. But after this group spent 117 seconds on the learning exercise, they did not improve their final accuracy one bit. Indeed, they just wasted 206 seconds, or about three and one-half minutes, by this exercise. The other group gained in its final performance 17 percent in time over its initial performance and the Error-Finding Group gained only 6 percent. The respective gains in accuracy were 22 percent and 0 percent.

TABLE II

AVERAGE TIME AND ERRORS OF 144 PAIRS OF THIRD-, FOURTH-, AND FIFTH-GRADE PUPILS

	TIME IN SECONDS				ERRORS	
	Initial Performance	Learning Exercise	Final Performance	Learning Exercise and Final Performance	Initial Performance	Final Performance
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Correct association group.....	95	59	79	138	2.4	1.9
Error-finding group.....	95	117	89	206	1.9	1.9

The records of these smaller groups given in Table III show without exception the same principles which we found when all these groups were merged into the 144 pairs. The differences so arrived at are real differences, as also were those of the earlier part of this study. To the lay reader, at least, the tendency of the data gained from a larger group to conform so consistently with the tendency of the data of the several component groups has a more concrete meaning than a probable error. Obviously, the computation of a probable error in this study would be superfluous.

In both these studies the data have no doubt failed to tell the whole story of the superiority of the correct-associations method. There was no assurance that the pupil always went through the entire performance of adding such a combination as $8 + 24 = 32$ when he said it to himself. There was some evidence that the pupil exercised on the correct associations attempted to remember the answers by rote and by position. In fact, the average child has in school about as much practice in finding errors as in making correct

associations. This fact may have made the measured superiority of the correct-association method less than it really is. All the more certain it is then that the method of teaching such combinations as have been here considered by having the learner check mistakes is a wasteful method.

TABLE III

TOTAL TIME AND ERRORS FOR EACH GROUP BY GRADES

	NUMBER OF REPAIRS	TIME		ERRORS	
		First Performance	Last Performance	First Performance	Last Performance
(1)	(2)	(3)	(4)	(5)	(6)
Grade V-B:					
Correct Association Group	38	2,300	1,902	67	49
Error-Finding Group	38	2,358	2,211	52	44
Grade IV-B:					
Correct Association Group	53	6,134	5,072	149	111
Error-Finding Group	53	5,833	5,477	105	110
Grade III-A:					
Correct Association Group	27	2,416	2,070	56	49
Error-Finding Group	27	2,464	2,422	55	55
Grade III-B:					
Correct Association Group	26	2,836	2,370	72	50
Error-Finding Group	26	3,039	2,722	63	57

To find mistakes some one else has made, however, seems to be a much more interesting exercise, in spite of its demonstrated inferiority, than the study of correct associations. This study neither answers the question, "Is it wasteful to find and correct mistakes in more complex problems like that of a store bill?" nor does it throw conclusive light upon the efficiency of checking as a means of teaching number work.

INTERFERENCE BETWEEN RELATED MENTAL PROCESSES

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CURIOUSLY enough in the discussion of transfer of training one point seems to have been agreed upon by all parties to the controversy, namely, that there is transfer of identical elements. In early experiments the identical element was an "idea"[1] common to both the practice series and the test series, or the identical element consisted of "sensations, images, movements."[2] Later by identical elements were meant "mental processes which have the same cell action in the brain as their physical correlates."[3] Such an identical element is probably not accessible to experimental investigation.

From the outset of the discussion, however, it has been claimed that, "improvement in addition will alter one's ability in multiplication because addition is absolutely identical with a part of multiplication and because certain other processes—for example, eye-movements and the inhibition of all save arithmetical impulses—are in part common to the two functions."[4]

This view is expanded by Gates into a theory of transfer,[5] and, since the identical elements of addition and multiplication, subtraction and division seem to be objective, this claim has gone far toward the belief that the study of the environment and reactions to it may well replace the study of the mind—one form of current behaviorism.

Professor Poffenberger tested the assumption that practice in addition transfers to multiplication, and that in subtraction there is transfer to division because of the partial identity of the processes.

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[1] Thorndike, E. L. *Psychology.* New York, A. G. Seiler Company, 1905. p. 256.

[2] *Ibid*, p. 164.

[3] Thorndike, E. L. *Educational Psychology Briefer Course.* New York, Teachers College, Columbia University, 1925. p. 269.

[4] *Ibid.*, pp. 268-69.

[5] Gates, A. I. *Psychology for Students of Education.* New York, Macmillan Company, 1924. p. 366ff.

Instead of improvement in multiplication due to practice in addition, interference was found; the unpracticed group made a better record on the final test than the practiced group. Between addition and subtraction there was found to be neither transfer nor interference, apparently indicating absolute independence of the two processes. This is exactly the opposite of our results as will be seen from the tables which are given later.[6]

In the investigation here reported we set out to test the effect of practice in addition upon addition, subtraction, multiplication, and division, and likewise the effect of practice in subtraction on the other three arithmetical processes. Since the two groups were practiced in different processes, it was believed that one group would serve as a control upon the other.

In the first series of experiments four persons were practiced in addition and four in subtraction after a preliminary test in the fundamental operations. After this period of practice a final test in the four operations was given to each group. The practice consisted of five periods of forty minutes each. The group worked for ten minutes followed by two minutes of rest. The following thirty-minute period was divided by similar two-minute intervals. Practice was given on alternate evenings except that Thanksgiving recess intervened which separated the last two practice periods by four days. Preliminary and final tests of addition, subtraction, multiplication, and division were each twenty minutes in length and arranged as in the practice series.

Because four persons seemed too few to yield reliable results, we next repeated the experiment with eighteen others, nine to be practiced in addition and nine in subtraction. Some of these subjects were Sophomores in college who were studying mathematics, and an equal number was assigned to each practice group. The results with nine persons did not materially change the results obtained with the earlier group.

Instead of finding, as did Poffenberger, that addition and subtraction are independent functions, we found them closely related.

[6] "The Influence of Improvement in One Simple Mental Process upon Other Related Processes," *Journal of Educational Psychology*, 6:470-74, October, 1915.

We found interference, however, between some of the processes. This seemed important. Although much better known in physiological studies than in psychological, interference must have destroyed completely the reliability of the results of thousands of experiments whose duration was not more than two or three minutes. Interference has been recognized in giving fore-exercises in psychological tests; but it has been named confusion, embarrassment, or nervousness. The recognition of the fact that interference may occur with no emotional accompaniment seems important. The mere incorporation of a simpler process in a more complex one may destroy all effect of practice in the former for a considerable time. Thus the simplicity or complexity of two processes may be far more important than the amount of objective identity between them. This fact, well known to introspection, is important in the arrangement of textbooks and in methods of instruction.

Since the results obtained with the smaller group, Group A, were fully confirmed by the experiments with the larger group, Group B, and by the tests of Group C, which will be mentioned later, the results for the first two groups are combined in Table I. The total number tested was twenty-six.

What appeared to be an enormous gain in the accuracy of addition due to two hundred minutes of practice, namely, 145 percent was found, yet Brown[7] reported a gain of 253 percent by one person due to only one hundred minutes of drill in the fundamental operations of arithmetic. There was an actual loss in both accuracy and speed of multiplication by those practiced in addition. By Poffenberger's interpretation, who took into account only the time gained in stating his results, our records for addition and multiplication would indicate that bonds must be broken in turning from addition to multiplication. I believe, on the contrary, that a more complex process interfered with a simpler one when addition was incorporated as a part of multiplication. There was probably no antagonism beyond this between multiplication and addition.

The group practiced in addition gained 3.0 percent in accuracy in subtraction and 6.6 percent in time. The subtraction group

[7] "An Investigation on the Value of Drill Work in the Fundamental Operations of Arithmetic," *Journal of Educational Psychology*, 3:492, 1912.

gained 23.0 percent in accuracy in addition and 16.7 percent in speed in that process. These amounts were large enough to appear indicative of a positive relation between addition and subtraction. If one acted as subject for such experiments—as the writer did—the explanation was simple. One found himself familiar with many combinations in addition which he immediately applied to subtraction. Having added 9 and 8 repeatedly he immediately noted that $17 - 9 = 8$, or $17 - 8 = 9$; and the recognition was instantaneous. In fact, the important result of our experiment

TABLE I

AVERAGE INDIVIDUAL GAINS OR LOSSES, GROUPS A AND B

	ACCURACY: PROBLEMS CORRECT		SPEED			
			PROBLEMS ATTEMPTED		TIME (Minutes)	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Addition Group:						
Gain in addition	5.1	145.0	3.8	32.0	.....	.....
Gain in subtraction	1.8	3.0	.6	.8	1.1	6.6
Loss in multiplication	2.6	5.2	.9	1.4	.....	.....
Gain in division	.0	.0	.4	3.2	.....	.....
Subtraction Group:						
Gain in subtraction	6.0	10.4	.8	1.0	5.4	28.0
Gain in addition	.8	23.0	1.8	16.7	.....	.....
Gain in multiplication	.3	.7	.4	.7	.....	.....
Gain in division	.0	.0	.4	3.0	.....	.....

seemed to be its indication that objective identity had little to do with the results; subjective identity had everything to do with them.

This is important because we are just now witnessing the complete elimination of association by similarity as a factor in economy of learning or as a factor in productive thinking from textbooks on educational psychology. Yet it is the similarity of combinations which causes the improvement from addition to subtraction and conversely, if actual experience in the tests is any guide to an interpretation of the results.

The group practiced in addition made no gain in accuracy in division. This was in agreement with the theory of identical elements if we ignored carrying. But neither did the group practiced in subtraction gain in accuracy in division, and such gain the theory of identical (objective) elements does demand. There was the same gain in speed of division by those practiced in addition as by the subtraction group.

Poffenberger concludes, "Where there are no identical bonds between stimulus and response in the two processes, the influence of one test upon another will be neither positive or negative, namely, there will be neither transference nor interference," and this he found between "addition-subtraction" and "addition-division." We have found addition and subtraction to be positively related, addition and division to be independent as far as accuracy is concerned; and these facts are supported by the independence of division and subtraction in respect to accuracy. But division is positively related in speed, and by the same amount, to both addition and subtraction. This amount is slight and may doubtless be accounted for by the fact that both groups practiced computation. Professor Poffenberger's experiment differed from ours because his subjects added or subtracted the same number, namely 17, to a series of fifty numbers in the case of addition and from a series of twenty-five numbers in the case of subtraction. In multiplication the multiplier was 7. Addition and multiplication were found to be negatively related or to suffer interference by Poffenberger, as in our own results. Since there is objective identity between addition and multiplication and between subtraction and division, the probability is that incorporating one process into the other causes interference and completely, or partly, overcomes any influence of objective identity.

By actually counting every single combination of addition, subtraction, and the like, in all these problems we were able to arrive at a score combined of speed and accuracy somewhat similar to the scholarship score used at Columbia University for correlating intelligence with scholarship. The results make a long table which may be summarized in Table II by stating the averages alone if we recall that thirteen persons were practiced in addition and thirteen in subtraction.

There was about half as much gain in division by those practiced in subtraction, as by those practiced in addition. Yet 32 percent of the efforts in division were subtractions. Only 14 percent were additions, if we assume that carrying tens, are additions --the students report that they did carry.

There was a marked improvement in the processes practiced, but, as here weighted, this was somewhat less in subtraction than addition. There appears to be a spread of effect from addition to subtraction. Only three of thirteen persons practiced in addition failed to improve in subtraction, and only two practiced in subtraction failed to improve in addition.

TABLE II

AVERAGE INDIVIDUAL SCORES, GROUPS A AND B, SPEED AND ACCURACY COMBINED

	Preliminary Test	Final Test
(1)	(2)	(3)
Addition Group:		
Addition	43.0	78.0
Subtraction	122.6	126.7
Multiplication	98.0	96.0
Division	91.0	93.0
Subtraction Group:		
Addition	43.0	52.0
Subtraction	118.0	133.0
Multiplication	91.0	91.0
Division	87.0	88.0

As weighted, there is a loss in the final scores in multiplication by those practiced in addition and no loss by those practiced in subtraction. Subtraction seems to have improved division one point, but this is negatived completely by the fact that addition improved division still more.

By assuming that adding, subtracting, multiplying, or dividing a single digit by another constituted one mental effort, we counted the mental efforts in these problems as accurately as possible. In only one average did the amount of improvement correspond with the theory of identical elements. This was entirely due to one person who made a very low record on the preliminary test.

It is sometimes stated that there should be as much improvement in multiplication, due to addition, as there is addition of partial products in multiplication. This seems to be a hasty assumption, and it was never fulfilled. A more reasonable assumption is that if 40 percent of a given multiplication test consists of additions, one who has improved 20 percent in addition should therefore improve 8 percent in the multiplication. We found this proportion illustrated just once. This was between subtraction and division problems. In our experiments mental processes seem to have been helped not at all by objective, partial identity and in no instance to the extent that the theory demands. Where the theory

TABLE III

AVERAGE INDIVIDUAL GAINS OR LOSSES, GROUP C, SPEED AND ACCURACY COMBINED

	Gain or Loss in Problems	Percent of Gain or Loss
(1)	(2)	(3)
Addition	.0	.0
Subtraction	4.5	6.8
Multiplication	1.5 loss	7.1 loss
Division	.4 loss	3.0 loss

demands improvement it was not only absent, but there was an actual loss over the preliminary efficiency.

Finally, in order to make more certain of our results, we assembled a year later twenty-three persons, eight of whom practiced addition, seven practiced subtraction, and eight took the preliminary and final tests but did not practice at all. The first two groups confirmed our previous results fully. Only the third, unpracticed control group, gave a different record and that perhaps was exactly what might be expected. The results which appear in Table III indicate that we were measuring the effects of the practice given in the experiments.

Since the experiments with larger groups confirmed fully those with the original small group, it seems evident that more reliable results may be obtained with two small carefully equalized groups, than with a random selection of hundreds of subjects on the

assumption that chance alone will equalize all differences. On Woodworth's theory, that we enjoy doing what we possess a special talent for, the prevalent experimentation on hundreds of subjects or reagents is due probably to a desire to treat the records statistically, rather than to a proved efficacy of the method.

CONCLUSIONS

1. If by identical elements is meant objectively identical elements, our results give no evidence that transfer is so limited.
2. Subjective identity of combinations in addition and subtraction was realized as a help by all who took the practice. This gives little support to the claim that introspection is the least reliable method of psychology.[8]
3. If Gates' theory of transfer is to hold true, identity must be defined in each instance and by terms less vague than identity of "attitudes," "methods," and "movements."
4. If our results give little evidence that objective and subjective identity are in practice the same thing, they give still less for the widespread assumption that motor learning—habit formation—and intellectual learning follow the same laws. It seems to have been overlooked that learning to send and receive telegraphically proceeds at quite different rates.
5. The full agreement of results from two larger groups with those obtained from a carefully divided smaller group gives little support to the assumption that random selection of many subjects will equalize or "cancel" all individual differences, both temporary and permanent.

[8] Benson, C. E., Lough, J. E., Skinner, C. E., and West, P. V. *Psychology for Teachers.* Boston, Ginn and Company, 1926. p. 6.

AN ASSOCIATION STUDY OF THE VOCABULARY OF GRADE CHILDREN

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WHILE numerous studies have been made concerning spelling and vocabulary in general, some phases of the subjects have remained uncultivated, and other phases are in need of re-working from a more practical point of view. Vocabulary for adults has received considerable attention, and some valuable work has been done in the field of the child's vocabulary. Most investigations, however, have been influenced by the needs of the adult rather than by the immediate, daily needs of the ordinary child. Because of this fact, the so-called established "children's vocabularies" show a disparity of 40 or 50 percent. As far as the writers have been able to ascertain, no one has given proper weighting to those words which the average elementary child uses in his daily life and which may not appear in school compositions or children's literature. On the suggestion of Dr. John C. Almack, of Stanford University, the writers have endeavored to investigate this aspect of the vocabulary problem.

The most extensive piece of research in vocabularies is Thorndike's monumental work in which he endeavors to establish the ten thousand most frequently used words in the English language.[1] Although his work has had a great influence and has stimulated other pieces of research, it may not be an adequate criterion for selecting words for elementary pupils, for, as Gates has pointed out, 86 percent of the material considered in the study was used by adults.[2]

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[1] Thorndike, E. L. *The Teachers Word Book.* New York, Teachers College, Columbia University, 1921. 134 pp.

[2] Gates, Arthur I. "The Construction of a Reading Vocabulary for the Primary Grades," *Teachers College Record,* 27: 625-42, March, 1926.

A recent and valuable work in the field of spelling is Horn's list of ten thousand words most commonly used in writing.[3] Since most of his sources deal with adults' vocabularies and his expressed aim is to determine the words most frequently used in the writing done outside the school, we may legitimately question whether his list is an adequate criterion for selecting the vocabulary most valuable to elementary-school pupils.[4] If one expects to meet the needs of the student, should not the present needs of the student be considered as well as the field of written English outside the school?

Breed has realized the necessity of considering the vocabulary from the child's point of view and has stated that vocabularies based on various types of written discourse are not satisfactory, since much of their material is not justified on the basis of social need.[5] His vocabulary list, however, consists of a composite of eleven adults' lists and five lists gathered from children's themes, with a majority of his words chosen from the adult sources.

Perhaps the most valuable study made on the basis of free association is that recently completed by Dolch under the guidance of Dr. Buckingham, of Ohio State University.[6] The aim of Dolch's study was to discover those words which constitute the vocabulary of most children in Grades III to VIII, inclusive. This investigation is of great value because the words are taken entirely from the vocabulary of the pupil. However, since it is based on free association without any stimulus word to direct, the writers believe that a need exists for a further study that will call for associations in a wide field of the child's experience.

The aim of this study has been a threefold one. The first aim was to discover those words that hold the most important place in the daily vocabulary of the child of elementary-school age. The

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[3] Horn, Ernest. *A Basic Writing Vocabulary: Ten Thousand Words Most Commonly Used in Writing.* Iowa City, Iowa, University of Iowa, 1926. 226 pp. (University of Iowa Monographs in Education, First Series, No. 4)

[4] *Ibid.*, p. 3.

[5] Breed, Frederick S. "What Words Should Children Be Taught to Spell?" *Elementary School Journal*, 26:118-31, 202-14, 292-306, October, November, December, 1925.

[6] Dolch, Edward William. "Grade Vocabularies," *Journal of Educational Research*, 16:16-26, June, 1927.

importance of these words was judged on the basis of richness of association. The second purpose was to examine these words as to their expression of fundamental necessities in the life of the child; and the third, to compare these words with words selected by other methods. It is evident, then, that the task has been to find those words that have been overlooked or undervalued in other studies.

TABLE I

NUMBER OF DIFFERENT WORDS IN EACH GRADE WITH THEIR FREQUENCIES AND NUMBER COMMON TO ALL GRADES

	Number of Different Words	Total Frequency
(1)	(2)	(3)
Grade IV	2,102	32,905
Grade V	2,108	42,389
Grade VI	2,827	52,845
Grade VII	3,017	55,987
Grade VIII	2,612	46,505
Total	4,515	230,631
Number common to all grades	.....	1,309

METHOD USED

The association method was used in this study, since it promised to be the most effective technique in discovering those words which are important in the daily life of the elementary-school pupils. The stimulus words were not taken from any established word list; the writers thought it best to be guided entirely in their selection by the elementary child and his environment. The four hundred stimulus words used in this study were therefore selected according to the following criteria: (1) words that come vividly into the daily home life of the child; (2) those that touch a large number of phases of the childhood experience; (3) those that pertain to experiences fundamental in the development of man; and (4) those that include name words, action words, and modifiers.

The 400 stimulus words as finally chosen included 316 nouns, 67 verbs, and 17 modifying words. These were arranged in eight lists of 50 words each. The nature of the words is shown by the following 50 words which comprise one of the eight lists presented to the students:

ankle	dressing	hurry	necktie	seem
barn	feed	infant	open	scold
bell	find	knob	perfume	spoon
bucket	fork	kitty	plants	spider
car	fight	lard	pink	soap
Christmas	gingham	listen	play	stick
cloudy	growl	milk	quit	thimble
cooky	handkerchief	machine	rug	towel
dentist	hide	metal	see	valentine
drop	hook	marbles	salty	write

In order to show better the range of the stimulus words, the following list of 35 words is given which contains a sampling of five words from each of the remaining seven lists of stimulus words:

camera	gas	vacation	chicken	newspaper
mirror	rubber	clock	flower	sleep
farmer	table	music	load	calf
skate	alfalfa	match	pencil	glass
violin	library	telephone	fence	letter
color	money	whistle	grass	magazine
dirty	rent	auto	happy	run

The eight lists were submitted to fifty students in each of Grades IV to VIII, inclusive, who were selected from eleven elementary schools in California and Oregon. The tests were given so that no one group of students responded to more than one list of stimulus words. This arrangement, it was expected, would give us a total of four hundred students responding to the eight lists in each grade, or two thousand students responding from all five grades. Since, however, some of the schools failed to return all the lists, the actual number of children whose papers were checked amounted to only 1,851.

Each list of 50 words was mimeographed on a sheet of paper with 25 words on each side. After each stimulus word, space was left for the student to write in four or five words which he associated most closely with the stimulus word. The group method was utilized in submitting these tests to the students. It was made clear that this was not a spelling test.

After the tests were returned from the various schools, all response words were carefully tabulated. This tabulation showed a total list of all words arranged in alphabetical order, the total frequency of each word appearing in any or all of the grades studied, and the number and frequency of all words appearing in each grade.

SUMMARY OF FINDINGS

The data in Table I show that 4,515 different words appeared in a tabulation of a total frequency of 230,631 words. The most significant fact, however, is the 1,309 words that are common to all the grades. The fourth-grade pupils responded with 2,102 different words; and 1,309, or 62 percent of that number, appeared in all the higher grades. This indicates that the majority of the fourth-grade words are fundamental to the experience and life of the elementary-school pupil since they are retained in all the grades.

Words of high frequency.—Perhaps the most important section of any vocabulary is that composed of words of high frequency. For purposes of comparison and analysis, all words in this study with a frequency of five hundred or more were segregated, which resulted in a list of 98 words of high frequency. The following groups are composed of those 98 words; the 25 words of highest frequency are in the first group and the remaining 73, in the second group. The lists illustrate the type of words revealed in this study as most meaningful in the life of the elementary-school child.

GROUP I

eat	dress	boy	clothes	stove
man	food	girl	cow	baby
wood	house	fruit	milk	cook
water	good	bed	flower	cake
tree	cloth	fire	meat	table

GROUP II

chicken	cold	dish	dog	play	chair
pretty	warm	work	candy	cat	hand
horse	paper	red	sweet	wash	wear
white	apple	bread	color	cut	face
green	hurt	picture	shoe	sleep	smoke
thread	woman	black	book	clean	coat
dinner	floor	glass	grass	hair	hot

iron	lady	light	money	mother	music
noise	people	pie	run	sick	stocking
butter	can	car	cry	dirt	door
egg	hat	head	knife	leg	letter
orange	potatoes	school	sew	smell	sugar
vegetables					

The 98 words may be classified as follows:

Categories	Frequency Number
Food	21
Home and family	18
Clothing	10
Body	8
Nature	6
People	7
Color	6
Animals	5
Recreation	4
School	4
Behavior	3
Miscellaneous	6

This classification clearly shows that the words of high frequency are those which concern the more basic and fundamental experiences of the human race. The growing child thinks in terms of food, family, clothing, and the body which are essential for his existence. While these words are important in the child's life, they may not be of high frequency in the adult reading and writing vocabulary.

Only sixty-one of the ninety-eight words of high frequency in this study are found in Thorndike's first 500 words, fifteen of the words do not appear in his first 1,000, and 3,000 words in his arrangement are required in order to cover the first ninety-eight words in this study. The fifteen high-frequency words not found in Thorndike's first 1,000 are:

stove	chicken	dish	candy	cat
thread	pie	stocking	dirt	knife
orange	potatoes	sew	smell	vegetables

The absence of the words just listed is all the more interesting since Thorndike's first 1,000 do include such words as *account, arrive, crown, moment, organ, power, remain, repair, seize, settle, units,* and *value.*

The high-frequency words compiled in this study increase in significance when these ninety-eight words are compared with the

first 3,000 in Horn's word list. Such a comparison appears in the following table:

Horn's Frequency Group	Number of Words
First 500	24
Second 500	22
Third 500	17
Fourth 500	10
Fifth 500	9
Sixth 500	7
Not in Horn	9

As this table shows, eighty-nine of the ninety-eight words of high frequency in this study are quite evenly distributed over the first 3,000 words of Horn's list, while nine of the words are not included in Horn's first 3,000.

The nine words become more meaningful when contrasted with some of the words which Horn does include, as is shown in the following lists:

WORDS APPEARING IN THE HORN LIST

First 1,000—	Second 1,000—	Third 1,000—
point	death	frame
material	relation	silence
factory	honor	lumber
copy	liberty	apartment
board	branch	battle
order	cotton	gun
time	banquet	silly

WORDS NOT INCLUDED IN THE HORN LIST

apple	hat	thread
dish	knife	smell
dirt	stocking	vegetables

Of these twenty-one words, taken from Horn's first 3,000 words, seven were found in his first 1,000, seven in the second 1,000, and seven in his third 1,000. Although these words were not carefully selected, they clearly show the fundamental difference between the Horn list and the words compiled in this study. Horn gives a much heavier weighting to the word *point* than to the word *dish* or *hat*. Even words such as *death, liberty, banquet, silence,* and *silly* are more important than *apple, knife, stocking,* and *vegetables.* Horn's first and fourth highest words are *time* and *order,* while the first and fourth highest frequency words in this study are *eat* and *water*. The first two words are of a more abstract nature and

play a more prominent part in adult life, while the latter two words are more concrete and vital in a child's life.

Words common to the five grades.—The analysis of the words tabulated in this study may be continued by giving attention to the 1,309 words which have a frequency of seven or more and which appear in each of the grades. The fact that these 1,309 words have a frequency of seven or more and are common to all grades is adequate proof that they should be given a prominent place in the vocabulary of elementary-school children.

When this group is compared with the first 3,000 words in Horn's tabulation, one finds that 665 words, or 51 percent, of the 1,309 words common to all grades are not included in Horn's first 3,000. This disparity, of course, arises from the fact that Horn's list was taken largely from adult sources. A classification of these 1,309 words into categories yields an order similar to that of the group having the highest frequency. The categories arranged in order of popularity are food, home and family, nature, clothing, body, behavior, animals, recreation, machinery, people, school, and color. The results of this study therefore seem to show a marked difference between the words of richest association in the daily life of the pupil and the standard word lists compiled from adult sources.

PREVALENT ERRORS IN NEW-TYPE EXAMINATIONS

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THE SUCCESSFUL use of standardized tests in elementary and secondary education and the apparent ease with which questions in objective form are devised and scored has led many to adopt these tests for informal quizzes and examinations. Frequently, however, the person making up such an examination is not schooled in the technique of test-building. For that reason he is led by the seeming simplicity of the method into framing questions which do not meet the intended purpose. In fact, it must be confessed that some of the so-called standard tests for courses in education have not been subjected to that rigorous item-by-item standardizing process which has characterized most of the best tests for elementary- and secondary-school subjects, and they have, therefore, failed to show the results expected.

Various treatises have set forth some of the principles of test construction, and Wood has called particular attention to certain subtle difficulties which may appear in common test forms.[1] It is the purpose of this article to call further attention to pitfalls which threaten the security of objective-test results. Instances where the pitfalls were not escaped will be shown. The ease with which such examples may be found warrants posting a few warning signs.

A matching test is usually thought to be a good one, particularly if the list from which matching items are to be chosen contains more items than there are things to be matched. The chances for error in such a test, however, are not so great as they appear to be. For example, a certain test of history-civics vocabulary gives 25 exercises to be matched from a list of 50 words. At the first glance it would seem that there are forty-nine chances for error. One exercise reads, however: "The large cotton farms in the South are called ....." Obviously the completion word must be plural

[1] Wood, Ben D. "Studies of Achievement Tests, II," *Journal of Educational Psychology*, February, 1926. 17:125-39.

in number, and examination of the list of 50 words reveals but two plurals, *plantations* and *reservations*, so the chances of error are reduced from forty-nine to one. Another test—a standard test for a college course in secondary education—gives a list of 34 words, 15 of which are to be used to complete sentences. One sentence reads, "The power of the church as an ..... factor in American life has diminished." Clearly, the word to be chosen must be an adjective and must commence with a vowel sound. The student, to be sure, may not analyze the problem thus completely, but he will look for a word which will make the sentence "sound right," and such a word must meet the described conditions. Now, of the 34 words, but two meet the necessities. These are *antagonistic* and *integrating*, and one of them is palpably unsuitable.

This same sort of error occurs in a book explaining the construction and use of the new-type examination. A sample test in plane geometry is shown in which certain blanks in a paragraph are to be filled with words chosen from an accompanying list. Two sentences of the paragraph read, "An ..... is a portion of the circumference thus cut off. The part of a circle included between two ..... and an ..... is called a ....." The words are *arc, center, circle, circumference, curved, equally, line, plane, point, radii, secant, sector, segment, straight, tangent.* There are only two words, *arc* and *equally*, which begin with a vowel and which will therefore sound right after *an*. As the sentence calls for a noun, *equally* is ruled out. In other words, only one word in the list will complete grammatically two of the four blanks indicated. The second sentence obviously calls for a plural, and there is only one plural in the list, *radii*. Even if the pupil did not know *radii* to be plural, he would find it hard to discover in the list any other word which would sound right. This, then, may be as much a test of grammar as of plane geometry.

In the standard test for a college course in secondary education which was mentioned previously the following sentence appears: "The evolutionary character of social progress requires a constant . . . of secondary education to the demands of society." Here some action word is needed and the list of 50 words contains but two which can possibly be used, *readjustment* and *resistance*. One who knows the meaning of *evolutionary* will hardly choose the wrong one.

Another exercise in this test very evidently begs the question. It is: "The aims of secondary education are not mutually exclusive; instead they are ....." One immediately sees that he must find an opposite to *mutually exclusive* and the list contains only one term which can even remotely fill the bill, *supplementary*. A similar begging of the question is found in the pure completion exercise: "Since people today do not work as many hours a day as formerly, the secondary school should provide the prospective adults training in the use of ....." Will any student of good intelligence who reads the first clause carefully fail to find a suitable word for the blank space?

Multiple-choice questions are sometimes too easy for the student because the test-maker gives as possible choices things which never are chosen. For example, we find in an informal test: "The largest share of one's daily work depends for its success on (the recall of previously learned reactions, the amount of money one has, one's good looks)." A tabulation of sixty-two consecutive cases from the members of two classes, all of whom indicated the correct answer, tends to confirm the suspicion that this exercise was not a test item at all—merely "busy work." A three-choice test may be in effect reduced to a two-choice one by such a question as: "Psychology, in constrast with sociology, has to deal with the behavior of (groups of people, the individual, neither)." Only through an accident would anyone mark *neither*. A choice which no one ever takes does not, of course, constitute a factor in a test.

A flagrant case of giving the question away is found in a standard test which requires the student to check two chief causes of unsuccessful teaching from a list of three—"too many outside interests," "disloyalty," "poor health." Aside from the fact that the list probably does not mention the chief causes of unsuccessful teaching, it is interesting to note that whatever two causes are indicated one of them must be right. Another exercise in the same examination instructs the student to mark nine considerations which the public school must consider in constructing curricula. Since the list from which the nine are to be chosen contains only thirteen items, five of the nine will be correct, and the chances are even that two more will be. No way of scoring can make the test good.

In these tests the bright student can sometimes discover and give what the instructor wants without putting any serious thought on the subject-matter involved. Recently the writer read a test on note-taking. The procedure of the test is to present a paragraph and then to submit five pairs of notes on the paragraph with the instruction that the best of each pair be checked. Six such exercises are given. The test seemed so easy that the writer tried the following experiment with a class of eighteen students. The first three exercises of the test were given in the regular way so the students clearly understood just what was wanted. In the other three exercises the paragraphs themselves were cut out of the test blanks, leaving only the pairs of notes. The students were then asked to pick out the best notes relating to absolutely unknown material. Half of the class was at least 80 per cent successful in identifying "best notes" on matter which had never been read. This, of course, does not say that the test was not a measure of something—possibly, even, of note-taking. What is evident is that it was not just the test its authors intended it to be.

The discussion thus far has concerned tests for which the student may get credit even though he does not, in reality, know the matter called for—tests, that is, which may more nearly measure ingenuity or intelligence than achievement. There is another type of error as a result of which the student may fail to receive credit when he does know the answer. The cause for this error seems to be the "mental set" of the test-maker. In one form of the Army Alpha Test, as others have noted, one is expected to mark "same" or "opposite" to the pair of words *cleave* and *cut*. Either of these is, of course, correct. In a test of biblical knowledge one is to mark the correct term in the sentence, "Testament means a book, a covenant, a will, a law." The key says that *covenant* should be underlined, although the dictionary gives equal sanction to a "will." The statement, "There is an essential ..... of interest between the individual and society," in a certain test requires completion with the word *congruity*. A student who selected the word *opposition* from the list offered might well argue for the correctness of his choice. Similarly, in an arithmetic vocabulary test of the matching-completion type, the accepted answers to "The ..... on his note is due in thirty days," "A modern manufacturing concern cannot

be run without ....." and "The company paid him a ..... of $4000 per year" are *principal, capital,* and *salary,* respectively. They might as well be *interest, profit,* and *dividend,* all of which are in the list, but these latter words do not receive credit.

In a test of "religious ideals" full credit for the question, "How do you think of Jesus?" requires the answer, "As the founder of the world's greatest religion." Tests in principles of education and similar subjects are apt to require similar dogmatic assent to propositions having other possible and plausible answers. The same test on religious ideals, after specifically warning a person to tell just what he thinks, requires one to put a cross before the five best answers to the question: "What do you think happens after death?" Two of the answers are: "We do not surely know" and "The dead live only in the memory of those who live after them." If a person checks the second how can he answer any other, and if he checks the first, what is the use of indicating anything else? Yet, to receive credit, one must indicate the first answer and four more. These errors of "mental set" are particularly common but not peculiar to the completion type of question, and they involve dangers against which every test-maker should guard.

The writer is in no way opposing the use of objective tests, formal or informal, for their value has been amply demonstrated. He is merely trying to point out that the construction of such tests is not so simple an affair as their appearance indicates and that unless the test-maker exerts great care the test may measure something quite different from that for which it was intended. Unless much attention is given to the number of items which might be chosen to complete a test, to grammatical construction, to the dissimilarity of different parts of the test, and so on, and unless the author of the test is able to free himself from "mental set" so that bivalent statements are avoided or recognized as such, the new-type examination will possess very little superiority over the old forms of examination.

A rather interesting indoor sport, and one that almost invariably illustrates some of the points made in this paper, is taking an informal test in one's own subject which has been made up by someone else. It is quite as amusing—and a trifle safer—if the author of the test is unknown.

AN EVALUATION OF ITEMS TO OBSERVE IN CLASSROOM SUPERVISION

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One-hundred and six superintendents, supervisors and principals at a recent meeting of school men assembled to discuss problems of classroom supervision made, at the writer's request, a list of the specific items of teaching usually observed by them in classroom supervision. These lists were made upon the spur of the moment and are probably not as complete or as carefully stated as they might have been under more favorable conditions, but they nevertheless represent certain more or less interesting facts about the present status of classroom supervision.

In the first place as one examines these materials, one is impressed by the lack of agreement among supervisors as to the important characteristics of teaching. These 106 supervisors supplied 131 different items to observe, 72 of which were mentioned only once. It seems a bit as if each supervisor employed his own system of supervision. This matter is one of some importance since supervisors[1] occupy positions of authority, hiring, dismissing and variously advising teachers according to these private systems of supervision. Are these various items important characteristics of good teaching? They seem like so many unvalidated test items, based upon the personal choices of the supervisors using them. A list of the twenty most frequently mentioned items is given below:

What Supervisors Looked For in Classroom Supervision

		Frequency
1.	Pupils' interest in subject	30
2.	Physical conditions in room	24
3.	Attitude of pupils	18
4.	Pupil activity	17
5.	Definite teacher aim	15
6.	Responsiveness of pupils	15
7.	Attitude of teacher	14
8.	General attitude of teacher and pupils	13
9.	Atmosphere of classroom	12
10.	Skill in teaching technique	12
11.	Evidence of teacher preparation	10

[1] The term supervisor is used here to include special supervisors, principals and superintendents.

12.	Method of instruction	9
13.	Assignment	8
14.	General appearance of room	8
15.	Evidence of pupil preparation	7
16.	Ability of teacher to "put across"	7
17.	Teacher and pupil coöperation	7
18.	Work going on	7
19.	Type of questions asked by teacher	6
20.	Discipline	6

A second characteristic of these items is their subjective character. Expressions such as attitude of pupils, atmosphere of the classroom, spirit of coöperation, responsiveness of the class, teacher's sense of justice, and move of the recitation, regardless of their importance as proper constituents of teaching, are entirely too subjective to serve adequately the purposes of classroom supervision. No two supervisors, for example, would probably agree upon the amount of attitude possessed by a given class, or the amount of spirit, responsiveness or move. The observation of this fact and the one already noted above has suggested a number of questions.

These questions may be stated as follows: (1) How valid are the items to observe which compose these various private systems of supervision? (2) How objective are they? (3) Can supervision be made more objective? (4) If a new system of supervision is postulated, what evidence is there that it possesses superior validity? (5) What evidence is there that it possesses superior objectivity?, and (6) What evidence is there that it possesses superior reliability to the old?

The materials to follow deal only with certain aspects of this wider problem of classroom supervision. In this sense the materials are fragmental and incomplete. What the writer really does is to set forth a certain theory of supervision with some evidence pertaining to its validity, reliability and objectivity. The data presented really do not constitute a solution to the problem presented. It is hoped, however, that the materials offered may clarify the issue and suggest a method of attack upon it. The problem is one of considerable importance to those concerned with the constructive supervision of teachers in service.

Theoretically, the subjective character of current items to observe seems to be due to their inferential character. Such expressions as atmosphere of the classroom, spirit of coöperation, responsiveness of the class, and the like, seem to be mere inferences

drawn by supervisors from objective data observed by them, these data not being included in the expressions (or labels) used to characterize the teaching performance observed. The point can be illustrated by an intangible expression such as "move of the recitation." A supervisor of my acquaintance was recently very much impressed with the move of a particular recitation. Now I do not know what "move of the recitation" meant to her, but it means to me the rate of teacher talk, plus the interval of wait between the teacher's question and the pupil response, plus the rate of pupil talk, plus the interval of wait between the pupil's response and the teacher's comment measured against my notion of what constitutes a satisfactory standard of "move." If one cares to analyze such expressions as these they can be reduced to lower terms which are more objective. The point may be further illustrated by the word, "sportsmanship." Now sportsmanship is an inference based upon observable activities. What the observer really does observe is the exchange of greetings by opposing captains, the slugging of one player by another, the assistance of an injured opponent to his feet, etc., from which he concludes that one group of players is more sportsmanlike than another. It would seem that *if supervisors could be trained to observe and evaluate teaching in terms of specific teacher and pupil activities that supervision might be made more objective.*

Several studies have been conducted to test the practicality of this hypothesis. It will be the purpose of this paper to give a preliminary report upon these studies and indicate some of the problems ahead in the development of scientific supervision. In general, the point of view taken is that items to observe, regardless of whether they are printed in formally prepared lists of items to observe or whether they are informally applied out of the supervisor's wealth of experience, must have *validity, reliability* and *objectivity.* Let us turn our attention to this problem.

The first study to be reported is a study of the validity of certain items to observe applicable to the supervision of the social studies.[2] The first step in this study was the development of a list of more or

[2] Barr, A. S. "A Study of the Teaching Performance of Good and Poor Teachers of the Social Studies in the Junior and Senior High School." Forthcoming—*Bureau of Research Bulletin,* University of Wisconsin, 1928.

less typical teacher and pupil activities (an activities check list) following the theory of objectivity already set for the above. This work was initiated by sending trained observers into the classroom with instruction to list the specific teacher and pupil activities observed by them during a class period. Two hundred fifty observations were made, each being for one full recitation period. These observers wrote down not what they thought about the teacher's work but what she and her pupils actually did. From these observations a preliminary list of teacher and pupil activities was compiled. This list was given a preliminary trial and further revised. The list as it was finally issued was composed of some thirteen papers of specific teacher and pupil activities. Two samples from this list are given below. In order to save space and to illustrate the next point the data for these two sections of the activities check list are filled in. One section of the activities check list deals with the characteristic actions of the teacher; another with the kinds of questions that teachers ask. The items contained in these two tables are more or less typical of the thirteen pages which comprised the entire check list.

TABLE I

CHARACTERISTIC ACTIONS OF THE TEACHER

ACTIVITY	NUMBER TEACHERS DISPLAYING CHARACTERISTIC IN SOME AMOUNT	
	47 good teachers	47 poor teachers
1. Laughs		
(a) at class	.....	2
(b) with class	31	7
2. Smiles (friendly, appreciatively)	32	22
3. Frowns	*	*
4. Gestures	24	19
5. Nods to pupil to recite	5	.....
6. Points to pupil to recite	8	3
7. Shakes head (disapproval)	2	.....
8. Snaps fingers (for attention)	.....	1
9. Nods approval	24	16
10. Giggles	.....	1

*Means no evidence collected.

Having prepared an activities check list, the next step taken was to study the validity of the various items contained in it. The

TABLE II

THE TEACHER'S QUESTIONS (KIND)

KIND	39 GOOD TEACHERS		38 POOR TEACHERS	
	Av. Freq.	St. Div.	Av. Freq.	St. Div.
1. Questions of fact (e.g., dates, people, places, events, etc.)	45.0	19.4	55.3	22.84
2. Memorized judgments (e.g., comparisons and contrasts, cause and effect, relationships, applications, impressions and opinions, answers given in textbook)	10.05	3.22	17.4	9.68
3. Expository questions (meanings, explanations and illustrations)	1.84	1.73	4.1	4.1
4. Real judgments (e.g., comparisons and contrasts, cause and effect, relationships, applications, impressions and opinions, answers not given in the textbook	16.60	11.43	11.2	8.61

reader will recall that an instrument of measurement is valid when it measures what it purports to measure. That is, in this case, each item must bear some definite positive or negative relationship to good teaching. There are several ways of testing this relationship. The relationship may be tested (a) by an analysis of expert opinion, (b) by studies of the activities of good and poor teachers, or (c) by controlled experimentation. The second of these methods seemed best adapted to a preliminary survey such as the study here reported and was the one used.

Forty-seven good teachers and forty-seven poor teachers were selected for study. The criterion of good and poor teaching was the judgment of three independent judges.[3] The study consisted of a careful comparison of the teaching performance of good and poor teachers upon the various items contained in the activities check list. Both qualitative and quantitative differences were noted.

In the two lists of items presented in Tables I and II there seem to be no significant differences between good and poor teachers. The first table is illustrative of the materials treating of qualitative

[3] For a fuller statement of the basis for selecting good and poor teachers, see Barr, A. S., "A Study of the Teaching Performance of Good and Poor Teachers of the Social Studies in the Junior and Senior High School." Forthcoming—*Bureau of Research Bulletin*, University of Wisconsin, 1928.

differences and the second table illustrative of the materials dealing with quantitative differences.[4] A qualitative difference, to be significant, must be some characteristic of teaching always present in one group of teachers and never present in the opposing group of teachers when an infinite variety of cases have been studied under conditions of perfect objectivity and reliability. No difference presented in Table I seems to be of this character. A quantitative difference to be significant must be *three times* the standard error of the difference. No difference given in Table II seems to be of this order.[5] Should all such items as those reported above prove to have little validity we should find ourselves in somewhat of a dilemma with items such as attitude of class, responsiveness of class, atmosphere of classroom, and the move of the recitation having no objectivity, (this statement is subject to statistical verification) and items such as the number of thought and fact questions asked by the teacher, the frequency of use of illustrative materials, and the time consumed by teacher and pupil having no validity. The problem is an interesting one.

Two further studies[6] pertained to the objectivity of various items to observe. Two methods of studying objectivity were considered: (a) The agreement of the observations of many observers using the same check list observing the same teacher teach; (b) the agreement of the observations of a relatively small number of observers using the same check list but observing many different teachers teach. The first procedure gives a fairly accurate picture of what a number of observers will do when observing the work of a particular teacher; the second procedure gives a fairly accurate picture of what a particular few observers will do when observing the work of many teachers. Both procedures were followed; data from the second method are given below; only a few of the items are given.

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[4] Qualitative and quantitative are used here approximately as these terms are applied in chemistry.

[5] The complete report does contain, however, some significant qualitative and quantitative differences.

[6] Schoonover, A. F. "A Study of the Objectivity of a Teacher's Check List." A.B. Thesis, Department of Education, University of Wisconsin, 1927.

Midthun, M. A. "The Objectivity of An Activities Check List for the Study and Improvement of Teaching." Master's Thesis, Department of Education, University of Wisconsin, 1928.

TABLE III

COEFFICIENTS OF CORRELATION BETWEEN THE OBSERVATIONS OF TWO INDEPENDENT OBSERVERS OBSERVING THE TEACHING OF A NUMBER OF DIFFERENT TEACHERS

ACTIVITY	COEFFICIENTS OF CORRELATION	
	First Study[a]	Second Study[b]
Teacher's use of the word "all right"	.92	.94
Gestures	.83	.88
Repeats answers	.71	.92
Corrects pupil's response	.90	.68
Times teacher walks about	.58	.94
Laughs with class	.70	.56
Use of blackboard	.55	.80
Memorized judgments	.54	.80
Follows up with more questions	.80	.50
Leans on furniture	.40	.84
Expository questions	.50	.72
Number of fact questions	.43	.77
Real judgments	.35	.71
Teacher smiles	.34	.45
Discipline	.78	.....
Assignment (character of)	.67	.....
Repeat questions	.40	.....
Supplies new information	.49	.05
Subject matter humanized*	.....	.20
Suggests methods of overcoming difficulties*	.....	.17
Use of pupil's experiences*	.....	.01

[a]Based upon 25 observations.
[b]Based upon 105 observations.

The entire activities check list of thirteen pages was used in these studies. The materials presented in Table III are merely samples from the larger number of items studied. Each pair of observers had one week of training. This training consisted primarily of memorizing the check list, accustoming themselves to tabulating the frequency of occurrence of various items, and in making comparisons of the frequencies secured. In the subsequent collection of data the observers worked independently; that is, there were no day to day comparisons of data. The object of this study was to determine the amount of agreement in the observations of two fairly well trained individuals working independently.

While the two studies are by no means in perfect agreement upon the objectivity of the various items studied they are sufficiently in accord to indicate approximately the amount of agreement to expect from observation made under the conditions under which

these observations were made. The higher coefficients of correlation, pursuant of the hypothesis previously proposed, are found in those data illustrative of specific teacher and pupil activities of the more detailed sort, and the lower correlations are found among general items such as use of pupil experiences, humanized subject matter, character of the assignment, etc. Unfortunately, for the larger study of objectivity, no items such as atmosphere of the classroom, attitude of the teacher, responsiveness of the class, move of the recitation, etc., appeared in the list. A very interesting fact, beyond the low and high correlations already referred to, brought out by these data is the varying degree of objectivity displayed by so-called objective items to observe. The agreement is by no means perfect, even with such items as gestures, smiles, laughs, walks, repeats answer, etc. It would seem thus that objectivity depends upon (a) the definition of the thing to be observed; (b) the amount of training of the observers, and (c) and the number of items observed simultaneously. This last statement is, of course, subject to statistical verification.

Two further studies[7] were made of the reliability of different numbers of supervisory visits. The items of teaching observed by supervisors in their study of teaching need to have not only validity and objectivity but reliability. This problem is again one of considerable importance to supervisors. How many visits should a supervisor make in order to get a reliable index of teaching efficiency? Or otherwise expressed, is the teacher's performance relatively constant or is it variable? Many supervisors operate upon the assumption that teaching performance is constant. To these supervisors the data gathered in a short ten-minute visit are sufficiently reliable to justify supervisory action. A sampling of the data is presented on the following page.

The data presented in Table IV are based upon the frequencies secured from five consecutive visits to each of a number of teachers. The average frequency of occurrence for each item for five visits for each teacher was first calculated. The data presented in Table

[7] Sigurdson, Sigurd. "The Reliability of the Activities Check List for the Study and Improvement of Teaching." A.B. Thesis, University of Wisconsin, 1927.

Struck, L. A. "The Reliability of the Activities Check List." M.A. Thesis, University of Wisconsin, 1928.

TABLE IV

THE RELIABILITY OF SUPERVISORY VISITS

ACTIVITY	M_1	M_2	AD_1	AD_2	V_1	V_2
1. Questions from class....	3.05	3.75	2.0	1.29	81.96	42.93
2. Incorrect responses.....	.....	4.05	.....	1.46	.....	45.06
3. Repeats answers.....	4.27	7.39	2.4	2.83	70.25	47.86
4. Corrects statements of pupils.....	1.95	4.26	1.25	1.7	80.12	49.88
5. Supplies new information	.51	7.58	.53	2.16	129.90	35.62
6. Follows up to pupils reciting.....	2.12	12.64	1.76	4.61	103.77	45.58
7. Follow up to class.....	1.09	7.37	1.04	2.66	119.26	45.73

EXPLANATORY STATEMENT. As has already been pointed out the data in this table are taken from two studies. The subscripts indicate the study from which the data are taken, M_1 is the average frequency for each item secured in the first study; M_2 is the average frequency for each item secured in the second study; AD_1 the average deviation for the first study; AD_2 the average deviation for the second study; V_1 the coefficient of variation for the first study; V_2 the coefficient of variation for the second study.

IV are the mean performance for seventeen teachers reported in the first study and twenty-one teachers reported in the second study. The average deviations and the coefficients of variations were similarly calculated. The findings of the two studies are not particularly consistent, but one would seem warranted, however, in drawing the conclusion that teaching performance is not constant.[8] Note for example, the average and average deviation for, "questions from the class," that is, questions asked by pupils. The average deviations are almost as large as the means themselves. Assuming that these data are correct and significant the variations are exceedingly high. Other items in the table support this general observation. Further study, however, will probably show that certain items are constant and others variable. Supervisors will need to know, however, the reliability of the items used by them in their supervision.

[8] It should be remembered that these data represent variable scores based upon two factors: (a) the objectivity of the items to observe; and (b) the variability of the teaching performance and not upon the latter alone as assumed in this discussion.

The point of these various studies is that items to observe, whether based upon formally prepared check lists or whether based upon the informal observations of supervisors, need to be tested for validity, reliability, and objectivity. The means by which valid, reliable, and objective items to observe are to be secured is by no means settled. Current items such as, atmosphere of the classroom, spirit of coöperation, attitude of the teacher, responsiveness of the class, etc, are too subjective to serve adequately the purposes of classroom supervision; isolated teacher and pupil activities such as those studied in this investigation seem objective enough but possess little validity. Thus we are left in somewhat of a dilemma. Of course new research upon the specific activities of teachers and pupils may indicate new activities of considerable validity. In the meantime the best guess about the procedure to be followed in the development of new items to observe would seem to be about as follows: (a) list first those facts, principles, and procedures known to be characteristic of good teaching. These may be derived from expert opinion, practice, or experimentation. (b) Translate each fact, principle, or procedure into specific teacher and pupil activities. (c) Test the scale so derived for validity, reliability, and objectivity.

The theory of developing valid, reliable, and objective items to observed set forth in this discussion has an interesting bearing upon the experimental study of teaching. The experimental study of teaching is frequently considered synonymous with objective supervision. But such can hardly be the case. Some of the experimental findings are sufficiently objective to serve the purposes of supervision and some are not. Freeman's principles of method in teaching handwriting given in the *Eighteenth Yearbook of the National Society for the Study of Education (Part II)*[9] are, for example, objective enough to be of immediate assistance:

Rule 1. The writer should face the desk squarely.
Rule 2. Both forearms should rest on the desk for approximately three quarters of their length.
Rule 3. The paper should be directly in front of the writer.
Rule 5. The forearm should form a right angle with the base line of the letters.

[9] Freeman, Frank N. "Principles of Method in Writing." *Eighteenth Yearbook of the National Society for the Study of Education, Part II.* Public School Publishing Company, Bloomington, Illinois, 1919.

Rule 7. The hand should rest on the third and fourth fingers, not on the side, etc.

Obviously the writer either is facing the desk squarely or he is not; both forearms either do rest on the desk for approximately three quarters of their length or they do not; the paper either is directly in front of the writer or it is not. That is, such materials are relatively objective. If the reader does not care to follow this line of reasoning the objectivity of the material can, of course, be tested statistically.

Frequently the conclusions of experimental investigations are not so objectively stated. Let us suppose that we have experimentally determined that those materials which are humanized are most interesting or that functionally acquired subject matter is longest retained. Such principles may have validity enough but no objectivity when applied by teachers and supervisors to the improvement of teaching. The supervisor needs to know what constitutes a correct application of the principle. The supervisor may say: "Is the teacher being observed at this moment making a valid application of the principle or is she not?" There is much leeway, for example, in defining such terms as project method, socialized recitation, and individual instruction. The question is always present of which project method, which socialized recitation, and which individual instruction. Experimental studies, particularly of the comparative type, that fail to describe objectively the methods or devices compared are really of very little value to either teacher or supervisors. As a matter of fact neither are they scientific. To be scientific, the methods or devices compared must of course be objectively described. The notion of describing methods of teaching in terms of specific teacher and pupil activities, qualitatively and quantitatively, already set forth at some length above, seems thus to supply a practical means of objectively describing the method or devices compared in the experimental study of teaching.

Similarly, principles of method must always be translated by both supervisors and teachers into specific teacher and pupil activities before they can be incorporated into new teaching procedures. This fact seems to have been overlooked by many experimentalists. The production of new principles of teaching, however, subjectively stated, will, of course, constitute a distinct contribution to the im-

provement of teaching. But this experimental work might be more helpful to teachers and supervisors if experimenters would remember to supply objective description of correct application of the principles experimentally derived by themselves. These data are all contained within the set up of the experiment itself. It cannot be otherwise if the experiment has any scientific status.

A final problem to which attention should be given is the general confusion of validity and objectivity in supervision. The fact that an item is objective does not indicate that it is valid. The supervisor may, for example, count with considerable exactness the number of smiles, frowns and gestures made by the teacher during the class period. Such data would probably be fairly objective. But such data will probably have little validity. That is, such items will probably not be determining factors in good teaching. This point seems to have been overlooked by some supervisors.

To further illustrate this point, let us suppose that the supervisor has collected the following data:

Type of Comment	*Frequency*
Commendatory remarks	13
Condemnatory remarks	2
Corrects statements	1
Repeats answer	12
Answers questions	6
Elucidates and elaborates pupil's answer	20
Follows up with more questions to the pupil reciting	10
Supplies new information	7
Indicates relation between courses and parts of courses	3
Gives interesting stories, anecdotes, illustrations	6
Summarizes and formulates conclusions	2
Explains meanings of words, diagrams, pictures, etc.	5

With these data at hand what should the supervisor say to the teacher? Is this teacher efficient or inefficient? Are the teacher's comments well made? Well, the truth of the matter is that no one knows. The data are objective enough, but if the supervisor interprets them to suit her own purposes the supervision is not scientific. The interpretation must be based upon statistically determined standards of teaching performance or experimentally determined principles. This is a matter of some importance that some supervisors seem to have overlooked.

It has not been the purpose of this paper to offer a summary of the results of a series of investigations but rather to state a problem.

Supervision as now ordinarily conducted is highly subjective.[10] How can supervision be made more objective? It is the writer's opinion, in the light of work done to date, that the answer will probably be found in experimentally determined laws, facts and principles of learning and teaching, each accompanied by an objective description of the proper method of application to teaching itself, the method of application being expressed in terms of specific teacher and pupil activities qualitatively and quantitatively described. Thus, as written examinations were systematized, checked for validity, reliability and objectivity, and issued as standardized tests, there would seem to be some reason for similarly systematizing the observations of supervisors, testing these observations for validity, reliability and objectivity, and issuing the systematized materials ultimately as *standard items to observe*.

[10] The reference here is, of course, to studies of the teaching process and not to the study of results of teaching by standardized tests.

THE HOW TO STUDY PROBLEM

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THE HOW TO STUDY PROBLEM

"Strawberries may come and strawberries may go, but prunes we have with us always." In such words the comedian calls attention to the prevalence of the commonplace in our lives and the occasional sporadic spurt of genius. If he were reviewing the nature of our educational progress of the last half century he would no doubt find "prunes" everywhere, but the luscious fruit would be in evidence on rare occasions and its seasons of short duration.

If he were limiting the scope of his activity still further and would apply his pun to our attempt to solve the "how to study" problem I fear that he would hardly find enough genius to permit the green berry to assume a hue so deep as to make it tempting.

A review of our attempt to solve this problem reveals an abundance of activity within the realm of mediocrity—an abundance of swivel chair opinion, an abundance of generalizations from a few stray and often manipulated facts, a verbosity which has been equalled only, in the past and present, by new sciences in embryo.[1]

A. We started our attempt when the educator was not a scientist, but when his chief problem consisted of selling his wares, of convincing the public that to study is a mark of good breeding, of culture, and when "how to study" had to be interspersed with an abundance of "what to study" in order to make the product salable. Whether the advice came from the pen of a Locke or Bacon, a Watts or Sandwick, whether written in the seventeenth or the nineteenth or twentieth century the same motive dominated the writer and the same method was used, the difference in genius probably being reflected by the degree of development of the embryo science at the time the advice was penned.

B. In the course of time a new science was conceived and its embryo began a rapid development. Its growth was more rapid

[1] For a more detailed summary of the attempts to solve the study problem see chapter one of *The Problem of Teaching High School Pupils How to Study*, Jos. S. Butterweck. Teachers College Contribution No. 237.

than that of education because it was fed on a better diet—the diet of objective evidence based on experimental data, and although a good deal of this evidence was collected from animal subjects rather than humans and a great deal of it was too meagre in amount to permit of the sweeping generalizations deduced from it, material was provided for a second attempt to solve the "how to study" problem. Deductions from generally accepted psychological principles became the accepted means for teaching pupils how to study. Whether these deductions were made by a Whipple or by the editors of our high school handbooks the purpose was the same, the difference in genius being determined by the degree of originality used by the writers.

C. Any new science is developed into maturity by the injection of a large amount of the opinion of the philosopher. Educational trend has been dominated by the formulation of the experiences of the past into a suggestive program of action intended to solve the problems of the present. Obviously, as the "experience of the past" accumulated and the "problems of the present" became more complex the philosophy of education changed. A resulting philosophy of education once generally accepted becomes the measure for all educational activities. So as the accepted philosophy of education developed through Herbartianism into Deweyism the "how to study" problem took the form of critical analysis, comparison, organization, and the like, and added the philosophic motive force of purposefulness. The result, whether coming from the pen of a McMurry or one of the lesser lights was the same—an effort to solve the "how to study" problem by measuring its effectiveness in terms of an accepted philosophy.

Are these three methods of attempting to solve this problem scientific? Not if science demands objective evidence as its basis, evidence collected *from* the situation at hand resulting in remedial measures applied *to* the situation at hand.

D. However, the "how to study" problem could not entirely escape the demand that education grow from its embryo into a fledgling science, and so we had to find out what pupils do when they study. However, with very few exceptions did the data thus collected enlighten us further than to suggest the time, place, and conditions under which such studying is being done, nor did it

attempt to distinguish between the successful and unsuccessful pupils and thereby provide data which might become the basis for a constructive program. Although we have had a departure from the "prune" diet the berry was not ripe enough to tempt us to eat heartily of it.

This leaves us in the midst of an unsolved problem with an almost unexplored field ahead. It is the field which has become the popularly accepted method of solving any problem—the scientific method. This requires an enormous amount of fact gathering and an even larger amount of experimentation. Like Rome it cannot be built in one day. It requires the collection of data which will help us determine what pupils do when they read for the purpose of studying, what they do when they are solving an original in geometry, and the like; also what pupils of high intelligence do and what those of low intelligence do in each of these study situations, what successful pupils do as compared with unsuccessful pupils. We must also determine what effect the classroom methods of the teacher have upon the study method of the pupil for each of these study situations.[2] Only then are we in a position to develop a sound technique for teaching pupils how to study for only then are we safe in stating the method which a particular pupil should use in a particular study situation, and only then are we in a position to give a teacher concrete suggestions as to what technique he should use in getting the pupil to adopt better study habits.

This may result in a radical reorganization of our teaching methods, it may remove emphasis from knowledge of content material as our outcome in teaching and fix it upon method of work or method of thinking, it may tend to make us more than ever conscious of the fact that the value of any particular bit of the content of a curriculum is not inherent in content, but is determined by the method which is used in teaching it, or rather in guiding the learning activity of the pupil. We may even find out that the degree of transfer of training resulting from anything which is being learned

[2] For a more detailed account of a scientific attack of this problem see "The Problem of Teaching High School Pupils How to Study" by Jos S. Butterweck, pp. 81-89, Fourteenth Annual Schoolmen's Week Proceedings, University of Pennsylvania. 1927.

is materially enhanced if the product of the learning is a method of attack rather than an accumulation of factual knowledge.

But, if we are to build a sound program of outcomes around method of work, method of thinking, method of study, method of reading, we must know what methods are best for a particular pupil in a particular learning situation and what methods of teaching will best result in bringing about in the pupil the particular study method desired. We have barely begun to answer these questions.

What do pupils do when they study? What do they do when they read an assigned lesson for the purpose of study, for the purpose of extracting the meat from the printed page? We have been told what they should do by McMurry, Book, and others, but what they have told us is not based on objective evidence but is a combination of opinion and deductions from principles generally accepted by the philosopher and the psychologist. If we find that the study activities engaged in by pupils do not coincide with those advocated by these "authorities" then should we continue to insist that they are necessary to successful achievement or should we modify our suggestions to meet the findings; or, if we shall continue to insist that our deductions from generally accepted principles are correct how shall we get pupils to adopt them in practice?

Purpose of This Study. In the hope that a little light will be thrown on our study problem the writer attempted to find out what pupils do when they are confronted with the problem of extracting the meat out of the printed page, and what difference if any exists between pupils of high intelligence and those of low intelligence, and what difference if any exists between the successful and the unsuccessful pupils if success is measured in terms of achievement in proportion to ability to achieve.

An effort was made to collect evidence with respect to five generally accepted desirable methods of work: (1) the reading should be purposeful, (2) if purposeful it should result in a selection of those things which will satisfy the purpose, (3) certain activities should be engaged in during the reading to insure thoroughness, (4) recall of that which has been read is an aid in fixing the essential facts to be remembered, (5) a final review of all that has been learned serves to clinch as well as to give unity to that which is being

studied. (It will be noticed that there is considerable overlapping in these five desirable study activities particularly as they are related to "thoroughness." If recall is practiced a higher degree of thoroughness is the result; if review is practiced greater thoroughness is the product; if a greater amount of selectivity of essential facts is practiced greater thoroughness quite likely follows. However, the writer thought that probably the only difference between the successful and unsuccessful pupil consists in the difference in pains which the successful pupil takes in the preparation of his lesson, devoting more time to it, repeating more frequently, observing more carefully, and the like, that the difference might be one of quantity rather than quality. It is this concept of thoroughness which we are trying to measure.)

Procedure. Ninety-eight teachers-college freshmen taking a course in Introduction to Education were used as the subjects. The intelligence scores used herein are Alpha scores obtained by giving Alpha test Form VII. The achievement scores are the term marks for the course "Introduction to Education." These marks represent an average of arbitrarily weighted daily quiz scores, unit tests, and a term examination, each marked on a point basis rather than percentage basis, each test and quiz so difficult that very few if any obtained a perfect score. This provided for each test or quiz a wide range of marks distributed in a manner approximating a normal curve. All tests and quiz marks were expressed as T-scores before averaging. The writer feels that the quizzes and tests were frequent enough and so administered and treated that the final score (achievement score) represents relative achievement in the course. Success in proportion to innate ability is expressed in terms of the sigma difference between intelligence and achievement and is hereafter referred to as the Studious Index.[8]

After the course had proceeded for a period of a month—long enough it was felt for the freshman to become adjusted to his environment, the school, instructor, and the course—each student was asked to bring his textbook (Cubberley's *Introduction to the Study of Education*) to class the next hour as well as paper and pencil. Upon presenting himself the next hour each student was asked to

[8] The method of determining this Index is more fully explained in Chapter 2 of T. C. Contribution No. 237 referred to before.

open his book on page 149 and devote thirty minutes to studying the content of pages 149-159 in the manner in which he was accustomed to study such an assignment. During this time the writer engaged in moving about the room and observing such mechanical habits of study as notetaking, underscoring, outlining, and the like, so that at the end of thirty minutes the writer had a list of students who engaged in each of these activities in so far as these could be observed. (Classes ranged in size from thirty to fifty.) The remainder of the hour was used in having each student give a written response to the following questions:

1) Did you finish your studying?

2) If not, where did you stop? That is, what more would you have been likely to do if you had the time?

3) Explain step by step what you did when you studied the lesson. (If you read the lesson carefully paragraph by paragraph then state this as one fact; if you underlined, state this as another fact. The class was encouraged to enumerate these steps in full and to list them after numbers indicating separate steps.)

4) Were you at any time given specific directions in How to Study? If so, explain briefly what you were told to do when reading or studying in a situation such as the one which just confronted you.

(This was followed by a series of factual questions intending to determine the quality of the study during the thirty minute period.)

These papers were then collected together with the notes which had been taken by those students who engaged in notetaking during their study. At the next meeting the work of the class proceeded as usual without reference to this departure from our regular routine. About a month later the same procedure was followed with another chapter in Cubberley's textbook, again without comment as to the purpose.

About a month after this each student was given a questionnaire, the purpose of which was to determine what specifically he had been in the habit of doing while preparing the assignment from the textbook used for this course. The method of the questionnaire was that of having the student check the activity or activities which most nearly applied to his particular method of reading for the purpose of studying.

Three types of responses were thus elicited: (1) the student's own statement as to what he did in a particular study situation, (2) the instructor's observation of the student activity, (3) the student's response to a questionnaire the method of which was that of having the student select from a large number of possible activities the ones which represent his study habits in a particular type of study activity. The first was in the form of a recall of what had just been done by the student. The second a record of what someone else had observed him doing. The third a recognition of the activities which formed a part of his study habits. An attempt was then made to combine these three student responses into one, by selecting common elements in the light of the five types of study habits to be studied. The general principle used in securing this composite was to determine the extent to which the first two corroborated the third (the questionnaire) and if no such corroborative evidence existed it was concluded that this was not a usual part of the student's study activity.

Purposefulness. The students were divided into three groups with regard to the degree of purposefulness evidenced in their study: (A) those who manifested a distinct evidence of purpose or aim; (B) those with whom there was a clear evidence of no purpose or aim; (C) those for whom the evidence was so conflicting that it was impossible to place them in either the (A) or (B) group.

Each of these three groups was subdivided into two: (1) those for whom the evidence pointed to a study of the subject matter as a whole; (2) those who seemed to be concerned with studying a paragraph or section until its content was mastered, and then proceeded to the next paragraph or section and in this manner continued until the whole had been mastered.

Approximately 6% of the ninety-eight students belong to the A-1 group (those giving evidence of a purpose or aim in their study as applied to the lesson as a whole) and 10% belong to the A-2 group (whose purposefulness applies only to individual paragraphs or sections and not to the lesson as a whole).

One-half of the total number of students belong to the B-1 group (studying the lesson as a whole without having in mind any definite purpose in their reading but simply noting new facts in the reading as they present themselves); and 28% belong to the B-2 group

(studying the lesson by paragraphs or sections but doing so without having any definite purpose in mind except to extract facts as they present themselves). Only 7% were placed in the C or doubtful group.

The following type of activities were accepted as giving evidence of a purpose or aim in reading: (a) skims to get gist of lesson; (b) looks at paragraph headings and then reads for supporting details; (c) reads over lesson as a whole so as to get general idea of lesson; (d) reads questions at end and then reads to answer these questions; (e) looks at summary sentence or paragraph and then reads for supporting details. It must be remembered that this purposefulness applies to the lesson as a whole for some and to individual paragraphs or sections for others.

What difference, if any, exists between those of high and low intelligence and those of high and low studiousness if the quantitative measure for the relative achievement is the "Studious Index"? Space does not permit giving more than the outstanding differences.

Among the 16% who give evidence of purposefulness (the A group above) there seems to be no marked intelligence difference, just a few more being included among those of above average intelligence (Alpha score of 134) than among those of below average intelligence, except for the fact that only one-fourth as many appear in the lower quarter of intelligence as would be expected if equally distributed. This type of study habit appears to be more common among those of below average "studious index" than among those of above average "studious index" by the ratio of 2.8 to 1.

This seems to point to the conclusion that students of average and above average intelligence and low relative achievement are more likely to be purposeful in their reading to study, than those of low intelligence and high relative achievement. This conclusion is corroborated by the 78% who compose the B group (clear evidence of no purpose or aim).

Selectivity. The following activities were recorded as giving evidence of selectivity: (a) selects certain parts to be memorized —reported by 19%; (b) underscores what he thinks important—76%; (c) takes notes of important parts—55%; (d) selects significant point of each paragraph—26%; (e) outlines while read-

ing—9%; (f) outlines after reading—15%; (g) selects mentally what seem like important points to be remembered—33%.

There seems to be no intelligence difference with regard to selectivity except that those in the lowest quarter are less likely to "select mentally what seem like important points to be remembered." What little difference there is between different levels of relative achievement points to the conclusion that the more successful students are more likely to "select certain parts to be memorized" and "outline while reading."

Thoroughness. The following activities were considered as giving evidence of thoroughness: (a) re-reads difficult portions—reported by 82%; (b) outlines what he reads—73%; (c) studies or memorizes parts considered important—73%; (d) notes references and footnotes—25%; (e) notes diagrams, pictures, etc.—40%; (f) puts thought of significant parts into a mental sentence—13%; (g) relates what is studied to what has gone before—25%.

Those of above average intelligence seem to indulge more frequently in "outlines what he reads," "notes diagrams, pictures, etc.," "puts thoughts of significant parts into a mental sentence" and "relates what is studied to what has gone before." Students of above average relative achievement reported more frequently that they "put the thought of significant parts into a mental sentence" than did those of below average relative achievement by the ratio of 2 to 1.

Recall. (a) Thirty percent reported practicing no recall; (b) 15% practiced recall but did not mention the nature of it; (c) 2% as a difficult or important passage is met; (d) 13%, after lesson has been read or studied as a whole; (e) 21%, by trying to answer questions at the end of the chapter; (f) 3%, by trying to answer self-made questions, and (g) 39%, occasionally while reading.

There seems to be no intelligence nor relative achievement difference in the practice of recall except that "no recall" is reported more frequently by those of above average intelligence.

Review. The following types of review are reported: (a) follows same method as at first reading—11%; (b) review is in form of a hasty view of what has been read—12%; (c) review is in form of a careful study of what was previously selected as important

—17%; (d) review follows same method as at first reading but with a somewhat higher degree of selectivity—42%.

Students of below average intelligence reported "review by approximately same method as at first reading," 2.7 times as frequently as those of high intelligence; "review is in form of hasty view of what has been read" is reported 1.7 times as frequently by those of above average intelligence; "review is in form of careful study of what was previously selected as important," by 1.8 times as many students of above average intelligence as by those of below average intelligence.

If we consider methods b, c, and d the most efficient methods of review then we find that those of above average intelligence employ this method about 1.5 as frequently as those of below average intelligence but that there is no difference between those of high and those of low relative achievement.

Conclusions. In drawing conclusions from these data we must keep in mind certain weaknesses in the study. (1) The number of cases which we have are too limited to suggest a finality to the conclusions even if no other weakness existed. (2) Has actual achievement been measured in the scores used for this purpose? The writer tried to incorporate sufficient elements to insure reasonable validity but he can offer no absolute proof that a high validity resulted. (3) Even if the achievement scores offered reasonable validity are we right in assuming that the "studious index" as herein defined measures relative achievement?

However with these limitations the following conclusions are suggested by the study. (1) At least 50% of college freshmen who read for the purpose of studying manifest no purposefulness (in the sense in which writers on "how to study" refer to this term); use underscoring and note taking as types of selectivity; reread difficult portions, and memorize parts considered important, to insure thoroughness. (2) From 25% to 50% of such students do their reading by paragraphs rather than the lesson as a whole; select the significant point of each paragraph, and select mentally what seem like important points to be remembered, as types of selectivity; note references and foot-notes, note diagrams, pictures, etc., and relate what is studied to what has gone before, to insure thoroughness; practice no recall and use recall occasionally while

reading; and in making a review follow approximately the same method as at first reading, with emphasis on those parts which had been previously selected as important. (3) Less than 25% practice the following study methods which are usually classed as necessary for intelligent study; give evidence of a purpose or aim in their study; using the outline method either while reading or after reading; put thought of significant parts into a mental sentence; practice recall after the lesson has been studied or read as a whole; try to answer questions at the end of the chapter; try to answer self-made questions; review by studying carefully what was previously selected as important. (4) Students of above average as compared with those of below average intelligence are more likely to study the lesson as a whole with a purpose in mind, underscore what they think important, outline after reading, select mentally what seem like important points to be remembered, note diagrams and pictures, put the thought of significant parts into a mental sentence, relate what is studied to what has gone before, practice no recall, review in the form of a hasty view of what has been read, and review in the form of a careful study of what was previously selected as important. (5) Those of below average intelligence are more likely to follow in their review approximately the same method as at first reading. (6) Those of high relative achievement are more likely to select parts to be memorized, underscore what they think important, put thought of significant parts into a mental sentence, practice recall by answering questions at the end of the chapter, review by following approximately the same method as at first reading. (7) Those of low relative achievement are more likely to have a purpose or aim in their reading (this seems incongruous but shows up decidedly in this study); they are also more likely to outline while reading.

Is such a conclusion an indictment of our methods of teaching pupils "how to study" or of the method of study which we advocate as being the best? If results in the form of pupil learning outcomes are to be considered the measure of our success then we must ascribe near failure to our efforts.

Would it not be wise to repeat such a study in varying situations to determine whether corroborating evidence exists?

EDITORIALS

A BELATED ACKNOWLEDGMENT

NEARLY four years have passed since the report of the Classical Investigation was published. We cannot say that the occasion was marked by an outburst of interest on the part of educationists. McAndrew had something to say about the report in January, 1925, and Judd paid his respects in February. Rugg devoted a few pages to it about a year later when he was summarizing in the Twenty-Sixth Yearbook of the National Society the work of various committees in curriculum-making. That is almost all, and since the three writers we have just mentioned were more or less unsympathetic, there is more than sufficient ground for representing the reaction of educational people to the report as distinctly chilly.

Yet the report was certainly a remarkable one. The United States Commissioner of Education was led to say after serious consideration: "There never has been a study of a secondary-school subject made in the history of education in our country which compares in its comprehension and in its thoroughness . . . . with the study that has been made by the [Classical League]." McAndrew speaks of "the refreshing honesty that permeates the entire report" and Rugg admits: "There never has been another committee report in which statements concerning aims and objectives, the content of the course, and methods of teaching, have been based so completely, page by page, upon quantitative data." The study therefore even at times out of the mouths of its severest critics wins commendation. Judd is the only one who yields nothing. To him the report is "defensive" in tone and "amateurish" in method. Moreover, his article is unrelieved by any expression of good will. That's one of the satisfactions one gets in reading an article by Judd—you always know where he stands. Moreover, when he speaks of his "disappointment" with the report of the Classical Investigation, you

know that he is enduring the disappointment with admirable equanimity.

Why must the critic—as a critic—be a protagonist at all? Most of the writers who have referred to the report on the Classical Investigation have consulted their prejudices. They are either "for" Latin as a school subject, or they are "against" it. If they are for Latin, they praise the report; if they are against Latin they condemn it, or they are "disappointed" with it. The criticism of the report gets all mixed up with a problem which the report did not attempt to solve, namely, whether or not Latin should be taught to anybody. Rugg, for example, says, "They [the writers of the Classics report] never really question the wisdom of teaching the existing content. *They assume that it should be taught*" [italics Rugg's].

Now one of the easiest and most superficial types of criticism is that which accuses an investigator of not doing something he never undertook to do. The Classics Committee, as was repeatedly announced both prior to the publication of the report and in the report itself, was to ascertain definitely the "present status of Latin and Greek" and to prepare "A constructive program of recommendations for improving the teaching of Latin and Greek." One would suppose that the only fair basis of criticism would be to start with this purpose in mind and then to examine the extent to which the committee carried out its purpose. If I agree and contract to walk from Columbus to Cleveland, it is obviously unfair to criticize me for not walking to Buffalo. It is like the series of questions leveled at Dr. Moore, one of the staff of the New York City Survey Committee after he had brought out his report on the administration of the school system of New York. The political administration did not like the report, so they proceeded to heckle the writer. Moore said the questions were as if, having been commissioned to travel from New York to Boston, he had been asked what he saw in Philadelphia on the way.

The Classical Investigation assumed, and it had abundant right to assume, that Latin was being taught and that for a considerable period in the future it would continue to be taught. One may believe that far too many children are studying Latin and may give

chapter and verse to support one's belief; but such a belief and such supporting data will have nothing to do with the problem proposed by the Classical Investigation. On the other hand, one may believe that every boy in school should study Latin and conceivably one may make an argument for such a belief; but again this is quite outside of the purpose of the Classical Investigation. In reality it makes no difference how many children are studying Latin. The investigation takes things as it finds them and seeks to improve them—surely a worthy undertaking.

Accordingly, it seems to us that the educators, who ought of all others to have welcomed an objective study of the teaching of the classics, either kept silent when this important study was brought to public attention or else they were guilty of criticizing the investigating committee for failing to carry out a purpose which it at no time entertained. Such criticism exemplifies a genial custom almost as common as "passing the buck" which may be described as the careful setting up of a straw man for the purpose of solemnly knocking him down.

One need not be greatly disturbed by the partisanship of the investigators. Is it to be expected—human nature being what it is—that a committee composed of the teachers of a subject will display hostility or even indifference to that subject? Isn't it recognized that the opinions of those who know most about a subject have practical value; and if the persons selected as competent to form an opinion have no sympathy with the matter under discussion, will not their opinions be of less value? It is our belief that among all the committee reports with which the Classical Investigation may be compared none is so free from partisanship, none so free from special pleading. It is true that the last chapter of the report is tinctured with propaganda, but this chapter constitutes less than one-tenth of the entire bulletin. Moreover, this chapter is so different in tone and treatment from the rest of the report—being probably written by another hand—that the veriest tyro in criticism ought easily to set it apart from the other nine-tenths of the report. We know of no valid canon of criticism which would permit one to estimate the entire report from a consideration of ten percent of it.

It is customary to praise a report if it is "constructive." Here we think the Classical Investigation is entitled to commendation.

It has given in detail both a method and a content for use in the improvement of the teaching of Latin. This part of the report constitutes a critical evaluation of the existing materials of instruction and reaches the conclusion that these materials, as well as the methods by which they are taught, are totally unsatisfactory. The committee by this means fearlessly clears the ground for its constructive reorganization. Thus the report is both frank in its treatment of existing conditions and constructive in its proposals for improvement. It is, as we have said, beside the point to argue that improvement in teaching Latin is of no consequence—to argue, in short, that the whole subject should be banished from the schools. In fairness to the committee we must grant them their problem and criticize their work by their treatment of it. It is here that we in education have failed to measure up to expectations. It is fair to assume that one of the reasons for our existence is the improvement of public education. If our devotion to this cause is sincere, we should welcome a report such as the Classical Committee brought out. And this for the reason—if for no other—that the report in substance demanded freedom for the secondary schools to develop the study of Latin for the educational good of the greatest number.

The teachers of Latin have themselves welcomed the report, and from every quarter their healthy reactions to it have been manifested. If no curriculum since 1924 has been formulated without reference to the Classical Investigation, if no textbook has been written or revised without claiming to exemplify its teachings, if no article by a teacher of the classics has failed to defer to it, then it can scarcely be said that the report was a failure. The Latinists without the assistance of the educationists are interpreting to the schools of the country the constructive program to which the Classical Investigation was devoted.

B. R. B.

NEWS and COMMUNICATIONS

There has just appeared from the National Education Association a pamphlet entitled *The College of Tomorrow—Its Relation to High School and to Life*. This pamphlet contains one hundred annotated references bearing on the topic. The references are drawn largely from magazines and have appeared during the last four years. All sides of the question seem to be presented, and one who wishes to know what those who write on the subject are thinking can get a good résumé from this annotated bibliography.

During the present year, the Educational Test Bureau of Minneapolis has been distributing the Kuhlmann-Anderson Intelligence Tests which consist of thirty-five separate tests. The first one is easy enough for five-year-olds, and the last is so difficult that no adult has ever been able to pass all of it. The tests are combined in groups of ten for various age abilities from primary to senior high school, each group overlapping with the previous group. The series is a valuable addition to the field of mental measurement.

Results of Achievement Tests Given in 1926-27 in the Elementary and High Schools of Michigan is the title of a University of Michigan bulletin by Walter G. Bergman (Bureau of Educational Reference and Research, Bulletin No. 110). The results are presented in a large number of tests by individual cities and groups of similar size. When the results of all tests are consolidated it is found that Michigan, as a whole, is just slightly below the grade level for the nation in Grades IX, X, and XI, while Grade XII is almost a full year below the level.

On the basis of the Otis Classification Test used in January, 1928, in the schools of Miami County, Ohio, Superintendent Sellers reports that of 487 eighth-grade pupils, 36 percent were up to their classification or better. For different types of schools the percents are as follows: centralized and village combined, 41 percent; two- and three-room schools, 27 percent; one-room schools, 11 percent. This seems clearly to indicate that the pupils of the smaller units are greatly behind grade standards as compared with the children in larger units.

Personnel Studies of Scientists in the United States by Ching-Ju Ho has been published by Teachers College, Columbia University, as No. 298 in the series of Contributions to Education. The author has studied the vocational histories of approximately ten thousand prominent scientists in twelve different fields and has attempted to answer questions regarding the opportunities

open in the various sciences, the necessary preparation for, the routes of progress in, and other personnel factors of the different scientific professions. It is an additional contribution to the field of vocational guidance.

Charles D. Dawson, assistant superintendent of schools in Grand Rapids, Michigan, has recently issued a special report on city failures of pupils for the past ten years. The tables show that the greatest percent of failure occurs in Grade I, with slightly more failures in June than in January. In about three-fourths of the cases the smallest percent of failures for elementary buildings has been in the high eighth grade. In only five of the eighteen semi-annual reports included in the study has the lowest percent of failure been in some other grade.

The United States Bureau of Education distributed at the Boston meeting of the Depar'ment of Superintendence an advance multigraphed copy of a bibliography of current research studies in education. Seven hundred sixty-two different studies classified under forty different heads are reported. The Bureau plans to issue later, in printed form, a bibliography giving descriptions and abstracts of research studies in education completed during the academic year ending June 30, 1927.

Courses for the training of teachers of sight-saving classes are being given this year at the University of Chicago, the University of Southern California, and the University of Cincinnati. Mrs. Winifred Hathaway, associate director of the National Society for the Prevention of Blindness, states that one of the chief reasons why there are only three hundred sight-saving classes in the United States and Canada while more than five thousand are needed, is that few teachers have the proper training and personal qualifications for this particular kind of instruction.

Those of our readers who wish to secure material for debating clubs on questions of foreign policy, or who may wish to keep themselves closely in touch with this field may be interested in knowing that there is a Foreign Policy Association with national headquarters at 18 East Forty-first Street, New York. This association publishes a weekly news bulletin and also has developed a fortnightly information service which works up more extensive material on special topics. Information service reports have already appeared, covering social, economic, and political questions in nearly every part of the world.

Dr. E. R. Downing, of the University of Chicago, has devised a rather unique test in elementary science or nature study. The test consists of six pages of illustrations for each grade. The same material is presented to children from Grades I to VIII inclusive, but the reaction requested varies. Grades I and II recognize a specific picture by placing a cross on the one designated; Grades III and IV give the name of each of the things illustrated;

Grades V and VI interpret; and Grades VII and VIII show further information regarding the different things illustrated by answering more complex questions. These tests are now being standardized and can be secured from the author.

A recent Congressional decree in Colombia provides for the foundation of a national university along the most modern educational lines. New schools of pharmacy and dentistry will be added to the already existing faculty of medicine and natural sciences of Bogota. In the faculty of law and political sciences, courses leading to a Doctor's degree in economics and social sciences will be organized. The same decree authorizes the government to send not more than four students every year to foreign countries for a two-year period of study. The scholarships will be distributed among students who have distinguished themselves through their studies in fields of art, commerce, industry, or religion.

The Division of Educational Research and Results of Philadelphia has published its report to the Board of Education on the work of the schools during 1926-27. Educational measurements in arithmetic, algebra, geography, history, health knowledge, spelling, reading, English, and handwriting are reported. In addition, a large number of the activities of the division, such as analysis of promotion rates, educational guidance, curriculum construction, objective test construction, publicity, and so forth, have occupied the attention of the workers in the Bureau to a greater or less extent. The "Summary of Findings" presents in concise form the testing projects, the conditions which were found to be satisfactory, conditions which needed to be improved, and the problems which are in need of further study.

The February issue of the *Educational Bulletin*, of the New Jersey State Department of Public Instruction, has called to our attention a publication of the National Association of High-School Principals entitled *Guidance in High Schools*. The subjects listed in this bulletin suggest its range of material, for example, "Guidance in Secondary Schools," "A Plan of Organization for Guidance within the Secondary School," "Methods of Giving Guidance," and "Essential Forms and Records." The bibliography covers a number of subtopics—general bibliographies; references for the teacher; magazines; references for vocational and educational information; and references on methods of study, on occupational information, on forms and records, on tests, and on placement and follow-up. The editor in the New Jersey State Department of Public Instruction, says of this bulletin, "With such a manual available it would seem unnecessary to issue a syllabus in general terms."

We recently received from the Department of Reference and Research of the New Trier Township High School, Winnetka, Illinois, three mimeographed bulletins on the general question of scholarship. One bulletin compares marks given boys and girls by individual teachers with those given by departments;

another discusses adviser-room scholarship; and the third gives scholarship statistics by subject. Among the pertinent questions which the Department asked the teachers in that high school are the following: (1) Are boys unable to do as good work in English composition courses as the girls, or is it true that the methods of teaching in these courses are more adapted to girls than to boys? (2) The boys' averages are higher than the girls' in the following subjects: Algebra I-B, geometry II-A, geometry II-B, economics civics, I-A, general science I-A, biology II-A, chemistry, III-A, and typewriting. What are the reasons for this? (3) Why did the boys in Roman history I-B do so much poorer work than those in Greek history I-A? (4) Why is there such a variation in the scholarship averages in United States history III-A, and United States history III-B? (5) Why do boys and girls do much poorer work in chemistry than in physics? These and a number of other pertinent questions should focus the attention of teachers on "why" in situations which are ordinarily allowed to pass without question.

The Health of the Teacher is a new publication of the Bureau of Education, United States Department of the Interior. Within this publication we find the following eleven commandments:

1. Thou shalt have other interests besides thy schoolroom.
2. Thou shalt not try to make of thy children little images, for they are a live little bunch, visiting the wriggling of their captivity upon you, their teacher, unto the last weary moment of the day; and showing interest and cooperation unto those who can give them reasonable freedom in working.
3. Thou shalt not scream the names of thy children in irritation, for they will not hold thee in respect if thou screamest their names in vain.
4. Remember the last day of the week, to keep it happy.
5. Humor the feelings of thy children that their good will may speak well for thee in the little domain over which thou rulest.
6. Thou shalt not kill one breath of stirring endeavor in the heart of a little child.
7. Thou shalt not suffer any unkindness of speech or action to enter the door of thy room.
8. Thou shalt not steal for the drudgery of many "papers" the precious hours that should be given to recreation, that thy strength and happiness may appear unto all that come within thy presence.
9. Thou shalt not bear witness to too many "schemes of work," for much scattered effort is a weariness to the soul and a stumbling block to weary fingers.
10. Thou shalt not covet thy neighbor's room, nor her children, nor her manner, nor her system, nor anything that is thy neighbor's, but work out thine own salvation with fear and trembling—only don't let anyone know about the fear and trembling.
11. Thou shalt laugh—when it rains, and wee, woolly ones muddy the floor, when it blows and doors bang, when little angels conceal their wings and wriggle, when Tommy spills ink and Mary flops a tray of trailing letters; when visitors appear nt the precise moment when all small heads have forgotten everything you thought they know.

    And again I say unto you, laugh, for upon all these commandments hang all the law and the profits in thy schoolroom.

The fifty-ninth annual meeting of the Department of Superintendence will be held in Cleveland, Ohio, February 24 to 28, 1929.

Ward G. Reeder, associate professor of school administration, at Ohio State University, and J. L. Clifton, state superintendent of public instruction in Ohio, have recently prepared a *Handbook for Rural and Village Boards of Education and Clerks in Ohio.* This is a manual of procedure for the conduct of the business of rural schools and is calculated to answer the most urgent questions which the board members and clerks of these schools face. The handbook is published and distributed by the Ohio State Department of Education, Columbus.

O wad some power the giftie gie us
To see oursels as ithers see us!

So sang Burns many years ago, and it has not been the fault of the poets if we have not seen ourselves in this light. The following, which appeared in the April issue of the *English Journal*, may give our readers food for reflection.

READ IT AND WEEP!

Research is too much with us; late till dawn,
Counting and charting we lay waste our powers;
Dissecting Beauty into graphs to label ours;
Dumb we become of soul; our hearts we pawn
To tabulate, and diagram, check till we yawn.
"A formula!" we're howling at all hours;
We trace the *p*'s and *q*'s to inmost bowers.
From lyric note and ecstasy the glory's gone:
It moves us not. Ye gods! I'd rather be
Victorian, nourished on Romance outworn,
So might I, this efficient century,
Glimpse foamy seas of faery lands forlorn,
Look off my book, see Venus rising from the sea,
Or hear in thunderous surge the Odyssey reborn!

—CARRIE BELLE PARKS

State Teachers College
Indiana, Pennsylvania

The January issue of *Teaching*, published by the Kansas State Teachers College of Emporia, contains the report of a survey of the Girls' Industrial School, at Beloit, Kansas. The survey was made by Dr. E. R. Wood, director of the Bureau of Measurements and Standards, and Dr. H. E. Schrammel, associate professor of psychology. There are 148 girls in the institution whose median age at the time of commitment was 15 years 2 months. The median length of time that the girls had been in the school at the time of the survey was slightly more than one year. On the average, the girls had not quite completed the eighth grade at the time of their commitment. Approximately one-third of them were four or more years over age for their grade. The results of the survey, both from the educational and sociological standpoints, agree closely with similar studies that have been made elsewhere.

Paul V. Sangren, director of educational measurements and research at the Western State Teachers College, Kalamazoo, Michigan, has lately brought out in mimeographed form a valuable study of the validity of intelligence tests available for use with first-grade children. The tests employed were, in addition to the Stanford Revision, the Otis Group Intelligence Scale Primary Examination, Form A; the Rhode Island Intelligence Test, Form A; the Detroit First-Grade Intelligence Test, Form A; the Kingsbury Primary Group Intelligence Scale, Form A; the Pressey Primary-Classification Scale, Form A; the Haggerty Intelligence Examination, Delta I; and the Pintner-Cunningham Primary Mental Test, Form A.

These tests were all given to one hundred first-grade pupils, and the results analyzed according to certain criteria of validity. These criteria were: (1) the nature of the distributions of mental ages and intelligence quotients according to the several tests; (2) the conformity of these mental ages and intelligence quotients to normal central tendencies; (3) whole and partial correlations with independent or partially independent measures of intelligence; (4) the deviations of mental ages and intelligence quotients taken singly or in pairs from the mental ages and intelligence quotients on criterion measures of intellect; and (5) the agreement among the tests on a threefold grouping of pupils.

The author feels justified in listing tentatively the group tests in the order of their comparative validity. That order is: Haggerty, Pressey, Pintner-Cunningham, Detroit First-Grade, Otis Primary, Kingsbury, and Rhode Island.

The United States Bureau of Education announced in April the establishment of a new service in its Division of Rural Education. Miss Mina M. Langvick, of Richville, Minnesota, has assumed the responsibilities of a specialist in rural-school curriculum. The types of service already established or in the process of establishment are the following:

1. General advisory and informational services through correspondence dealing with curriculum problems and reports of progressive movements in rural-school curriculum construction.

2. Research studies dealing with such problems as the development of techniques of procedure in curriculum construction, and curriculum units.

3. Field service in connection with special research studies, and upon the request of school officials concerned with the development of programs of curriculum construction, plans and techniques of procedure, preparation of curriculum units, and similar or related problems.

Miss Langvick has a Master of Arts degree from Teachers College, Columbia University. She has had direct contact with problems of rural education as a teacher in the one-room rural school, in the high-school teacher-training departments of Minnesota, and as a county supervisor of rural schools in the states of Delaware, Maryland, and Indiana.

A REVISED ACCOMPLISHMENT QUOTIENT

In the January number of this magazine, William R. Wilson showed conclusively the fallacy upon which the accomplishment quotient is based. He points out that it is virtually impossible for a child with a high intelligence quotient to have a high accomplishment quotient and that a child with a low intelligence quotient will nearly always have an accomplishment quotient of more than 100.

The writer wishes to propose a new definition for the accomplishment quotient which will not be subject to this criticism. The accomplishment quotient, as ordinarily used, means the educational age divided by the mental age. The proposed definition is that the accomplishment quotient shall be the educational age divided by the predicted educational age. The predicted educational age is to be found by means of the usual regression equation as follows:

$$\text{Predicted } EA = \frac{\sigma EA}{\sigma MA} \cdot r\,(MA - \text{mean } MA) + \text{mean } EA \quad \ldots\ldots\ldots (1)$$

$$\text{Then } AQ = \frac{EA}{\text{Predicted } EA} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

In order to find the accomplishment quotient by these formulas it will be necessary to use the correlation coefficient between the mental ages and the educational ages, the standard deviations of the mental ages and the educational ages, and the means of the mental ages and the educational ages. The calculation of the predicted educational age by formula (1) is not difficult, since the value of

$$\frac{\sigma EA}{\sigma MA} \cdot r$$

is a constant quantity.

By the proposed method the average accomplishment quotient for any group will be 100, irrespective of whether the group ranks high or low in average achievement. If it is desired to show how the group compares with established achievement norms, formula (1) should be changed by substituting the mean MA for the mean EA.

The use of formulas (1) and (2) for calculating the accomplishment quotient has the following advantages over the usual method: (1) The negative correlation between the accomplishment quotient and the intelligence quotient is eliminated. (2) It is well known that the educational age of a group tends to have a smaller range of distribution than the mental age. The formulas here presented allow for this difference in standard deviations, whereas the other method does not. (3) If a class or group has had inferior instruction or suffered from other common handicaps, the customary method gives to most of the members of the group an accomplishment quotient below 100. For such a group, the method here proposed yields accomplishment quotients in accordance with the extent to which each member has availed himself of the opportunities offered him.

North Central High School, Spokane, Washington P. H. NYGAARD

REVIEWS

VOEGELEIN, L. BELLE (Comp.). *List of Educational Subject Headings.* Columbus, Ohio, Ohio State University Press, 1928. xiv + 337 pp.

Education as a subject of study, as a social science, as an art, has greatly enlarged its boundaries during the last generation. Concurrently there has "just growed" a chaotic and scattered terminology, confusing to readers and students. It has been difficult, almost impossible, for librarians, cataloguers, indexers, and members of research bureaus, who are charged with organizing for quick and easy use the fast-increasing printed matter in this field, to use this terminology.

The book under discussion is the first competent and professionally accredited attempt to select and consolidate, and make authentic and serviceable, educational terminology. It was compiled by Miss Voegelein, reference assistant in the Bureau of Educational Research, Ohio State University, in cooperation with the National Education Association Commission on Coordination of Research Agencies. Its sponsors wisely do not offer a scientific and logical classification, although they played for a time with that alluring bibliothecal bomb. The chief purpose of this book is to index, not to classify. It offers a complete alphabetical list of all topics with which educational literature, very broadly regarded, is concerned. The inclusion and the exact form of each topic have been carefully weighed. References are made to the form so chosen from every variant under which an active pedagogical imagination could fancy that it would ever be sought by students. All related topics are firmly and fully bound together by cross references which have been chosen and arranged according to accepted principles of cataloguing.

The larger subjects are again subdivided alphabetically to facilitate more minute indexing or arrangement of the actual materials. It is quite possible by imagining each heading as on an envelope, or other container in which are placed the materials thus indexed, to visualize a combined library and index ready for direct consultation without the use of an intermediate card catalogue. Such a unit, however, must be equipped with the requisite guides and cross references. The numerous short notes which follow and explain the scope and content of certain headings having other than educational connotations are helpful and represent a new feature in formal lists of subject headings.

The making of a thoroughly good classification or list of subject headings in any field calls for more than a moderate knowledge of the content and techniques of two subjects. Miss Voegelein's training and experience in both education and librarianship assure one of the excellence of this laborious, meticulous, and exceedingly useful piece of work.

The book is well printed and tastefully bound. The pages have wide margins for the inevitable additions. Brief but explicit introductory paragraphs give all the needed explanations for using the book in different ways.

New York State Library J. I. WYER

SMITH, DAVID EUGENE, AND REEVE, WILLIAM DAVID. *The Teaching of Junior High School Mathematics.* Boston, Ginn and Company, 1927. viii + 411 pp.

The development of the junior high school has been accompanied by a marked reorganization of the mathematics for Grades VII, VIII, and IX, and a consequent improvement of teaching to present changed courses and to meet newly defined objectives.

The recent book dealing with this task contains a discussion of these objectives, outlines the content and organization of the courses, and offers guidance in the teaching of the materials. The units advocated may be described as arithmetic, intuitive geometry, algebra, numerical trigonometry, and demonstrative geometry. Several model lessons are given in detail, and treatments of supervision and instruction, tests, home-made instruments, clubs and contests, and recreations are given.

Statements in the introductory chapter on the curriculum indicate that the authors discount investigations for determining the mathematics used in adult life and that they have based their choice of materials to be taught upon the opinion of teachers of mathematics. Yet they begin the next chapter by saying that "it should never be forgotten . . . . that the main purpose of teaching arithmetic is to train children to compute accurately and with reasonable speed in those operations which they will probably use in later life." On the same page, they say that "[courses of study] often tend to perpetuate obsolete processes, obsolete business methods, and obsolete terms, rules, and definitions that have no place in the modern school." Certainly, the traditional courses here criticized have been the product of opinion, and the investigations which the authors discredit have done much to expose the uselessness of the material in question.

In the lengthy chapter on objectives there are no citations to earlier treatments of the topic, although the materials appear to have been considerably influenced by such earlier work. Examination of one of the twenty-four references listed in the chapter bibliography leads us to wonder how much the authors are indebted to it. A sentence in the Preface, however, gives us the impression that the bibliographies are given to provide wider reading for students:

> Since the book will be used chiefly in institutions of collegiate grade and by those preparing for positions of more than usual responsibility, there have been included numerous bibliographies and lists of questions and topics for discussion. (p. iv).

Accepting this designation of those who will use the book we should expect it to do much toward familiarizing its readers with the contributions of the

more prominent workers in the field. Investigations are ignored, and the body of the text does not mention even such workers as Thorndike, Schorling, Clark, Woody, Buckingham, Courtis, Ruch, Buswell, Knight, and Wilson. There is no indication, in either text or bibliographies, that the authors are aware of the existence of about fifty Masters' and Doctors' theses which have been presented within the past three years and which have direct bearing upon the teaching of junior high-school mathematics.

The insistence of the authors upon a unit of demonstrative geometry in the junior high school is yet to be justified. It is highly significant that in ten years of this attempted reform Smith's leadership has not been followed, and investigations have not shown the desirability of such a unit.

The chapter on tests gives us practically no information about them. After a superficial criticism of tests in general, the authors state six "guiding principles underlying good tests." Then they present nine samples of their own tests, saying: "If such tests are not included in the textbook used by the teacher, he should carefully analyze the skills that he wishes the pupil to master. He should then make tests to fit that analysis and use them both as teaching and as testing devices" (p. 344). With the exception of three lines concerning the Rogers prognostic tests, no mention is made of any of the standardized tests.

One of the distressing traits of this book is the frequent expression of feeble thought, particularly in matters of psychology and pedagogy. For example, "What do you know about logarithms?" is cited by the author as being a poor question for the reason that "the pupil might properly answer 'Nothing' and then claim full credit for answering the question correctly" (p. 296). Many thoughtful teachers would consider the place of motivation in remedial treatment where the authors say that "if the pupils have not done their part, [the teacher] is faced with a disciplinary problem" (p. 8). Psychologists will be interested in this statement: "Psychology has modified the old adage that 'practice makes perfect,' so that it reads 'interested practice makes perfect'" (p. 277). Here is a promise for the old gentleman who is greatly interested in golf but plays with his hands crossed.

A book with the serious faults and deficiencies just mentioned can scarcely be recommended for use by students. They should have every opportunity to know about workers in the field and their findings.

RALEIGH SCHORLING

University of Michigan

LEHMAN, HARVEY C., AND WITTY, PAUL A. *The Psychology of Play Activities.* New York, A. S. Barnes and Company, 1927. xviii + 242 pp.

In this book the authors contribute what they believe are the initial approaches to the problem of training children for a profitable use of leisure; that is, first, a quantitative study of what children actually do in their leisure

time, and, second, an evaluation of the many activities of childhood in terms of their individual and social worth.

The first three chapters give a short résumé of the changing attitude toward play in which antagonism has been rapidly supplanted by appreciation. The authors, however, do not dwell long on the educational philosophy of play. They assume that play is a "direct educative agent" and use a few apt quotations from Dewey, McDougall, and others to substantiate this point of view. One of the best chapters is that on "Theories Which Seek to Explain Play." It is complete, up-to-date, and penetrating. The authors content themselves with a clear statement of their researches of the various theories and do not attempt to add anything original.

In the fourth chapter, after considering the different techniques which have previously been employed in the study of the play behavior of children, the writers fully explain their own technique. They gave each child who was tested a comprehensive list of two hundred play activities, and had him check those which he engaged in of his own volition, those which he liked best, those to which he devoted most time, and those in which he participated alone. The rest of the book is concerned with the findings of this study.

These tests were given to more than six thousand school children in Kansas City after preliminary investigations of smaller extent had been carried out in surrounding cities and rural schools. The findings are placed in graphic form and conclusions are drawn concerning the effect upon play behavior of such variables as age, sex, race, season, intelligence, community, and other influences. These conclusions are summarized at the close of the respective chapters.

In addition to its presentation of a new technique for studying play behavior and its contributions to curriculum construction, the book contains many suggestions for future studies of play behavior. The value of this book, in fact, may be said to lie as much in its suggestions as in its findings. This is particularly true of the last chapter which is entitled "Play in Relation to Education and Vocational Guidance." The reader of *The Psychology of Play Activities* will find an attractive, original, and scientific study of some of the most important problems prevalent in the field of play and recreation.

ELMER MITCHELL
University of Michigan

FENTON, NORMAN, AND WORCESTER, DEAN A. *An Introduction to Educational Measurements.* Boston, Ginn and Company, 1928. v + 144 pp.

In the six chapters of this small book the authors have presented in simple, forceful language the essential facts which university instructors have learned from taking courses in educational measurement. They have had in mind many of the theoretical implications and limitations of test usage, but in a few instances, such as in the accuracy of the accomplishment quotient, they have not been sufficiently critical. In the introductory chapter and in the chapters on intelligence and achievement tests they have brought together and answered effectively some of the commonest questions the layman is apt to ask. The

chapter on the local construction of new-type examinations summarizes some of the current writings and practices but possibly does not show a complete knowledge of that phase of test construction. The chapter on statistics shows how to carry out the simple processes and explains briefly a few terms relating to the more complex procedures. The final chapter suggests a form and procedure for studying the child from all angles and for recording permanently the findings. The point of view of the whole book is that of using tests to give the teacher an understanding of individual children.

Aside from the fact that the book is unusually well written, there is little, if anything, which can be considered as a contribution. Some phases of testing are coming to be recognized which are scarcely suggested. The value of intelligence tests as an aid to teaching is being increasingly questioned. To those who tend to distinguish sharply between tests suitable for the administrator, the supervisor, and the teacher, the book is painfully lacking in helpful suggestions. The value of tests for purposes of diagnosis and of planning remedial instruction is mentioned, but no adequate suggestions are given. The discussion of grouping on the basis of test results is not specific and includes no statement of the principles involved; one is led to infer that the authors are most interested in acquainting the reader with procedures rather than helping him to solve a problem. So many of the most helpful present-day uses of tests are omitted or inadequately discussed that one is forced to ask whether the book may not aid in continuing the pernicious practice of giving tests just for the sake of doing the popular thing instead of finding problems and aiding in their solution. The book is to be criticised for what it does not contain; what it does contain is thoughtfully done and well written. There are several books covering the measurement field about as adequately. Why add another unless it makes a contribution?

W. W. Coxe

New York State Department of Education

Morgan, John J. B., and Gilliland, A. R. *An Introduction to Psychology.* New York, Macmillan Company, 1927. ix + 319 pp.

The two professors of psychology at Northwestern University who designed this textbook for use by high-school students have done an excellent piece of work. As would be expected, disputatious material is omitted, and the content follows in the main the traditional lines, with chapters on such standard topics as the nervous system, reflexes, habit, sensations, attention, perception, learning, memory, imagination, and reasoning. Psychological method is briefly touched upon in the introductory sections, wherein there is also an excellent statement of the purposes and technique of science at large. Borderland phenomena are sanely discussed in chapters or sections on sleep, dreams, hypnotism, thought-transference, and superstition. The best chapters, in my judgment, are the two dealing with emotions and effort.

The general plan of presentation is to preface each chapter with an outline of its contents (how much better than to relegate it to a summary at the close

as most authors do!), to head each paragraph with an italicized statement of its import, and to conclude each chapter with a dozen or twenty questions and three or four references to well-known texts. From a literary point of view the presentation is satisfactory. The book could be read more easily, however, if several hundred commas and semicolons could be judiciously sprinkled about its pages. It may be the publisher's idea that it interests the reader to keep him guessing where the various portions of a compound sentence start and stop.

A favorite indoor sport of reviewers is to tell the authors what they might have written in place of what they did write. (I recall one reviewer who used all his space for that.) I must forego this pleasure, for, after all, no two persons would agree as to what ought to be put in a psychology for high-school students and what ought to be omitted. However, I shall permit myself to call into question here a few statements that seem to me unjustified, if not factually erroneous. I refer to the implication (p. 181) that a poor reader can better his reading by deliberately trying to move his eyes differently; to the injunction "Never try to fight distractions" (p. 143, whereon the illustration seems to me not to fit the point); to the use (p. 211) of "immediate memory" as synonymous with "fleeting memory"; to the attempt to prove it pays to study by quoting figures (p. 201) on the continuance of high-school scholastic success in college; to the recommendation (p. 216), with no qualifications, of the "whole" method of memorizing; and to the injunction (p. 228) not to try to recall a thing when you can't seem to do so. These inadequacies—if such they be—are trivial in comparison with the numerous merits of this new textbook.

Danvers, Massachusetts GUY M. WHIPPLE

CRAIG, GERALD S. *Certain Techniques Used in Developing a Course of Study in Science for the Horace Mann Elementary School.* New York, Teachers College, Columbia University, 1927. vii + 72 pp. (Teachers College, Columbia University, Contributions to Education, No. 276)

Dr. Craig first made an investigation of several hundred courses in nature study but found that "the outstanding characteristic of the nature study and science programs in elementary schools seems to be lack of organization." He then inquired, "What are the contributions of science which are such an important part of our social heritage that they should be passed on from generation to generation?" With this point in mind he adopted three major goals for elementary science in the grades. These were, first, to present those scientific conceptions which, when understood, greatly influence the thought reaction of the individual and which have modified thinking in many fields; second, to impart those habits, skills, and information in science "that are important because of their function in establishing health, economy and safety in private and public life"; and third, to give "those facts, principles, generalizations and hypotheses of science which are essential to an interpretation of natural phenomena which commonly challenge children."

Under these goals were listed specific objectives which are "definite enough to suggest and define instructional materials." The objectives were obtained from *The Nature Study Review*, courses of study in elementary science, source books in nature study, and similar professional literature and authoritative treatises on science, all of which are named in the Appendix.

The list was submitted to 188 laymen for evaluation on the basis of the use they have made of them in their own experiences and the 88 specific objectives were ranked on the basis of these returns. To rank them in the order of importance as determined by nearly seven hundred questions secured by children in Grades I to VII was next undertaken. Finally the author attempted to evaluate the importance of the specific objectives in terms of the use made of them in authoritative treatises on science.

It is a joy to find a book that endeavors to secure a fact foundation for the selection of the science materials of the grades. The author himself points out the many studies that will be required before the factual material is adequate to make final safe judgments upon the matter. The book, however, is a long step in the right direction, and the science program for the Horace Mann Elementary School is being built on the results of the study.

ELLIOTT R. DOWNING

University of Chicago

PUBLICATIONS RECEIVED, FEBRUARY 15 TO MARCH 15

BOOKS FOR EDUCATIONAL EXECUTIVES

Borgeson, F. C. *The administration of elementary and secondary education in Sweden.* New York, Teachers College, Columbia Univ., 1927. 231 pp. (Contributions to education, no. 278) Cloth, $1.50. Paper, $1.25.

Brubacher, J. S. *The judicial power of the New York state commissioner of education; its growth and present status with a digest of decisions.* New York, Teachers College, Columbia Univ., 1927. 173 pp. (Contributions to education, no. 295) Cloth, $1.50. Paper, $1.25.

Burns, R. L. *Measurement of the need for transporting pupils; basis for state equalization of transportation costs.* New York, Teachers College, Columbia Univ., 1927. 61 pp. (Contributions to education, no. 289) Cloth, $1.50. Paper, $1.25.

The Denver program of curriculum revision. Denver, Colo., Board of Education, 1927. 103 pp. (Monograph no. 12)

Duvall, S. M. *The Methodist Episcopal Church and education up to 1869.* New York, Teachers College, Columbia Univ., 1928. 127 pp. (Contributions to education, no. 284) Cloth, $1.50. Paper, $1.25.

Engelhardt, Fred, and Goldthorpe, J. H. *Building program, Austin public schools, Austin, Minnesota.* Minneapolis, Minn., Univ. of Minnesota, 1927. 54 pp. (Educational monograph, no. 16) $.50.

Harap, Henry. *The technique of curriculum making.* New York, Macmillan, 1928. 315 pp. $1.80.

Holzinger, K. J. *Statistical methods for students in education.* Boston, Ginn, 1928. 372 pp. $3.60.

Jewett, I. A. *English in state teachers colleges; a catalogue study.* New York, Teachers College, Columbia Univ., 1927. 176 pp. (Contributions to education, no. 286) Cloth, $1.50. Paper, $1.25.

Johnson, G. B. *Organization of the required physical education for women in state universities.* New York, Teachers College, Columbia Univ., 1927. 171 pp. (Contributions to education, no. 253) Cloth, $1.50. Paper, $1.25.

National Education Association. Department of Superintendence. *The development of the high-school curriculum.* Washington, The Author, 1928. 584 pp. (Sixth yearbook) $2.00.

Reed, M. M. *An investigation of practices in first grade admission and promotion.* New York, Teachers College, Columbia Univ., 1927. 136 pp. (Contributions to education, no. 290) Cloth, $1.50. Paper, $1.25.

BOOKS FOR PSYCHOLOGISTS

Chassell, J. O. *The experience variables; a study of the variable factors in experience contributing to the formation of personality.* Rochester, N. Y., The Author, 1928. Unp. $.75.

Griffith, C. R. *Psychology and athletics; a general survey for athletes and coaches.* New York, Scribners, 1928. 281 pp. $2.00.

National Society for the Study of Education. *Twenty-seventh yearbook: Nature and nurture.* Bloomington, Ill., Public School Publishing Co., 1928. Part I, Their influence upon intelligence. 465 pp. Part II, Their influence upon achievement. 397 pp. $1.75 each.

Snedden, D. S. *A study in disguised intelligence tests (interview form).* New York, Teachers College, Columbia Univ., 1928. 48 pp. (Contributions to education, no. 291) Cloth, $1.50. Paper, $1.25.

Wallin, J. E. W. *Studies of mental defects and handicaps.* Oxford, Ohio, Miami Univ., 1925. 177 pp. $.75.

Weld, H. P. *Psychology as science; its problems and points of view.* New York, Holt, 1928. 297 pp. $2.50.

Wilson, G. M., and Hoke, K. J. *How to measure.* Rev. and enl. New York, Macmillan, 1928. 597 pp. $2.00.

Wilson, F. T. *Learning of bright and dull children.* New York, Teachers College, Columbia Univ., 1928. 56 pp. (Contributions to education, no. 292) Cloth, $1.50. Paper, $1.25.

BOOKS FOR TEACHERS AND SUPERVISORS

Clem, O. M. *A work book syllabus in principles of education; twenty selected units with problems and references.* Baltimore, Warwick & York, 1928. 170 pp. $1.80.

Cox, Sidney. *The teaching of English; avowals and ventures.* New York, Harper, 1928. 172 pp. $1.50.

Crafton, Allen, and Royer, Jessica. *Self expression through the spoken word.* New York, Crowell, 1928. 235 pp. $1.75.

Crawford, C. C. *The technique of study; a textbook for use with upper secondary and lower division college students.* Boston, Houghton Mifflin, 1928. 353 pp. $2.00.

Finney, R. L. *A sociological philosophy of education.* New York, Macmillan, 1928. 563 pp. $2.50.

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